

3690



THE IRISH NATURALIST.

A Monthly Journal

OF

GENERAL IRISH NATURAL HISTORY,

ORGAN OF THE

*Royal Zoological Society of Ireland ; Dublin Microscopical Club ;
Belfast Natural History and Philosophical Society ;
Belfast Naturalists' Field Club ; Dublin Naturalists' Field Club ;
Cork Naturalists' Field Club ; Limerick Field Club ;
Ulster Fisheries and Biology Association.*

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VOL. XIII.

DUBLIN: EASON & SON, LIMITED,
85 MIDDLE ABBEY STREET, AND 40 LOWER SACKVILLE STREET,
BELFAST: 17 DONEGALL STREET.
LONDON: SIMPKIN, MARSHALL HAMILTON, KENT & Co., LTD.

1904.

PRINTED BY ALEX. THOM & CO. (LIMITED), 87, 88, & 89, ABBEY-STREET, DUBLIN.



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The Irish Naturalist.

VOLUME XIII.

ADDITIONS TO "IRISH TOPOGRAPHICAL BOTANY" IN 1903.

BY R. LLOYD PRAEGER.

[Read before the Dublin Naturalists' Field Club, December 8th, 1903.]

IN publishing the third annual summary of additions to the Irish county lists, a very satisfactory advance has again to be recorded. It might have been expected that last year's list of 207 new county records would not be equalled in any subsequent year; yet the list for the past year reaches 219, and in point of interest surpasses the results achieved in 1902. The personal authority for the new records is less evenly distributed than was the case last year. Miss Knowles has a list of 22 from Limerick; Dr. Scully adds 10 for Kerry S., and 18 for Kerry N.; Mr. Colgan's Dublin contribution numbers 8; for more than half the total (112 out of 219), I am responsible, the divisions mainly concerned being Limerick (9), Mayo W. (26), Sligo (26), and Down (9). For the remaining 49 we have to thank Mr. Barnes, Mr. Lilly, and a number of others.

The most important papers of the year refer to the botany of Kerry¹, Limerick², Dublin³, West Mayo⁴, and Down⁵; and though several of these areas are, botanically, among the best known portions of our island, the papers record a number of valuable additions to the floras of these Divisions. An interesting paper of more general bearing, which supplies a

¹ Scully: Notes on the Kerry Flora, 1902. *I.N.*, xii., 113-116.

² Knowles: Notes on some additions to the Flora of County Limerick: *I.N.*, xii., 249-253.

³ Colgan: Some recent records for the Flora of County Dublin. *I.N.*, xii., 186-191.

⁴ Praeger: The Flora of Clare Island. *I.N.*, xii., 277-294.

⁵ Praeger: Botanizing in the Ards. *I.N.*, xii., 254-265.

dozen new county records, is that by Prof. Johnson and Miss Knowles on plants in the Levinge herbarium¹. A large number of short notes published in this Journal supply material which goes to swell the records of the year. A remarkable feature of the year's publications is the fact that, with the exception of those contained in the paper by Prof. Johnson and Miss Knowles, every new county record which has been published, has appeared in this Journal. A continuance of this happy state of affairs would much facilitate future reference by botanical workers.

Of unpublished matter, a good amount has come into my hands, and is classified and listed below. I am again under a debt of gratitude to many helpers. Mr. W. A. Barnes has continued his observations on the Meath and Cavan floras; Mr. C. J. Lilly has furnished a number of notes of missing plants of various counties. I have also to acknowledge my indebtedness, for specimens or for information, to the following:—Capt. Barrett-Hamilton, Prof. Birmingham, Rev. S. A. Brenan, N. Carrothers, Mrs. Clements, Miss Evelyn Cradock, J. H. Davies, Miss Maude Delap, Rev. W. W. Flemyng, P. H. Grierson, Rev. Canon Hartley, Miss Annette Hemphill, Rev. W. F. Johnson, Mrs. Frank Joyce, W. F. de V. Kane, Miss Knowles, Mrs. Leebody, Rev. Canon Lett, T. A. Mapother, Miss Massy, Joseph Meade, F. W. Moore, S. A. Moore, Miss Charlotte O'Brien, R. A. Phillips, H. W. Pugsley, Dr. George Scriven, S. A. Stewart, W. N. Tetley, W. J. C. Tomlinson, C. Waterfall, and the Hon. Mrs. Wynne.

The best plant of the year is *Glyceria festucaeformis*, a Mediterranean maritime grass new to the British Islands, which I had the good fortune to find growing along several miles of shore on Strangford Lough; its habitat and range, and the interesting problem of its occurrence in Ireland, I have dealt with in this Journal (xii., 255-258), and Dr. Rendle has figured and described the plant, from Strangford specimens, in the *Journal of Botany* (xli., 353-356, tab. 455). Two *Hieracia*, *H. Orarium* and *H. rivale*, are also additions to the Irish flora. Some important extensions of the range of rare plants have been chronicled during the year. The finding of *Pinguicula*

¹ Johnson and Knowles: The Levinge herbarium. *Sci. Proc. R.D.S.*, (n.s.) x., 122-132.

grandiflora in Clare, if the plant prove to be indigenous there, is the most important of these. *Rosa hibernica*, extended from Down to Limerick, is another interesting find, though, in view of the English distribution of the plant, not surprising. Mr. Stewart's discovery of *Juncus tenuis* near Belfast shows that this interesting rush is not confined to south-western Ireland, as formerly appeared. Dr. Scully's Killarney record of *Rubus argentatus* supplies a second station for a bramble hitherto found only in E. Mayo. The rare British-endemic *Hieracium hypochaeroides*, long known in Ireland only from Clare, and recently found in W. Cork, is now extended northward to W. Mayo. Several plants which we associate with the southern half of Ireland, such as *Geranium columbinum*, *Valerianella Auricula*, *Chenopodium rubrum*, and *Carex divulsa*, have been pushed northwards into Down. *Silene acaulis* has been extended southward, and *Saxifraga decipiens* northward, into W. Mayo.

The plant on which rested the Down record of *Hieracium sciaphilum*, is now referred (Watson Bot. Exch. Club Report, 1902-3) in part to *H. murorum* var. *pellucidum* and in part to *H. diaphanoides*, the latter of which is unrecorded for Ireland; but Mr. Waddell recommends a postponement of the acceptance of this transfer till a further series of the Rowallane plant has been gathered and reported on.

The records for the past year include several critical plants and aliens that now claim admission to the Irish list, as given in *Irish Top. Bot.* As regards critical plants, *Fumaria purpurea* Pugsley must take its place alongside the other segregates of the Capreolate Fumitories. *Arctium Newbouldii* Ar. Benn. must also be inserted. Mr. Bennett's view (see *I.N.*, xii., 289) is that British Burdocks must be listed as *A. majus*, *A. intermedium* Lange (= *A. nemorosum* Lej.), *A. minus*, and *A. Newbouldii* Ar. Benn. (= *A. nemorosum* Bab.) Whether or no *A. intermedium* and *A. nemorosum* be combined, *A. Newbouldii* should be distinguished and its distribution worked out.

As regards aliens claiming naturalization, I wrote in *Irish Top. Bot.* (p. xcv.)—"Alien plants naturalized in only one locality are usually omitted . . . since their present claim to admission to the flora may depend on local and temporary influences." Several species thus excluded in *Irish Top. Bot.*

may now claim insertion, having been shown to be well established in several parts of the country. These plants are :—

Lepidium Draba, L.—Well established in Limerick (several stations), Dublin, and West Mayo. Also reported from E. Cork, Kilkenny, Wexford, Armagh, Down, and Antrim, but not yet to be reckoned as established in these.

Valerianella carinata, Loisel.—Established in Kerry and Down; has held its ground and increased in the latter county for over 30 years.

Tragopogon porrifolius, L.—Long established in several places around Belfast, and less satisfactorily about Cork; now reported as well established in Limerick also.

On the other side of the account, it is less pleasant to have to withdraw, or note the withdrawal of certain county records already published. Mr. R. M. Barrington finds, on revisiting the only Irish station of *Rubus Chamæmorus*, that the plant is confined to Tyrone; so the record for Londonderry (and for District XII. of *Cybele Hibernica*) must be expunged. Mr. H. W. Pugsley has been good enough to examine the Fumitories in my herbarium, and, although the naming of them, as of all which I have published over my name, rested on better authority than my own, his revision shows that the Fumitory list in *Irish Top. Bot.* will need extensive correction. The bulk of the specimens upon which my own records were founded are now in the National Herbarium; when the results of Mr. Pugsley's examination of these are known, further corrections than those given below will be required. Next season I hope to get together a good lot of Fumitories, and with Mr. Pugsley's kindly promised assistance, to make a step towards the reconstruction of the Irish list. I may add that all the *Fumaria* additions of the present year are given on Mr. Pugsley's authority.

It may be well to put the withdrawals of the year into formal shape :—

Fumarla Boræi, Jord.

10. Tipperary N.—Withdraw.

24. Longford.—Withdraw.

F. muralls, Sonder.

22. Meath.—Withdraw the Oldcastle record.

31. Louth.—Withdraw the Boyne-mouth record.

Rubus Chamæmorus, L.

40. Londonderry.—Withdraw.

Among the aliens and excluded plants of the year, several interesting species are newly recorded for Ireland, as established in one station—*Archangelica officinalis* in Kilkenny *I.N.*, xii., 246), *Bryonia dioica* in Dublin (*ibid.*, 187), *Blitum capitatum* in Fermanagh (*ibid.*, 271), and *Luzula albida* in Down (*ibid.*, 272). Prof. Johnson records *Poterium muricatum* from Kildare, on specimens in the Levinge herbarium. An extension of the range of any of these may yet entitle them to a place in the Irish list.

Following on the lines of previous papers, a list is now given of the additions of the year, under the botanical divisions. The fact that almost all the published additions of the year appeared in this Journal enables me to give references to these records, by means of a number appended to each name, which signifies the page of the *Irish Naturalist* for 1903 upon which the record appears. The remaining published records (those contained in Johnson and Knowles' paper on the Levinge herbarium, in *Sci. Proc. R.D.S.*), are distinguished by an asterisk placed *after* the names of the species.

1, KERRY S.—

Ranunculus Drouetii, 113.

Fumaria purpurea, 113.

Rubus pulcherrimus, 114.

iricus, 114.

pyramidalis, 114.

Potentilla procumbens, 114.

Callitriche obtusangula, 114.

*Cuscuta Trifolii, 115.

Orchis latifolia, 115.

Bromus racemosus, 116.

2, KERRY N.—

Ranunculus heterophyllus, 113.

Fumaria purpurea, 113.

Cochlearia danica, 114.

*Diploaxis muralis, 114.

Rubus argentatus, 114.

*Valerianella carinata, 114.

*Matricaria discoidea, 114.

*Crepis biennis, 115.

Centunculus minimus, 115.

Orchis latifolia, 115.

Ophrys apifera, 115.

Potamogeton plantagineus, 115.

*Bromus secalinus, 116.

* commutatus, 116.

Equisetum trachyodon, 116.

Chara polyacantha, 116.

Tolypella glomerata, 116.

3, CORK W.—

Arctium Newbouldii.

4, CORK MID—

Fumaria Boræi, 137.

5, CORK E.—

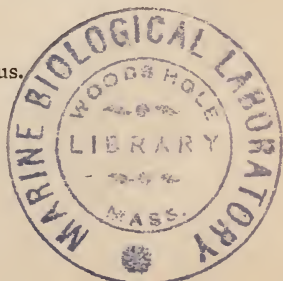
*Tragopogon porrifolius.

6, WATERFORD—

Fumaria Boræi.

7, TIPPERARY S.—

Lemna gibba.



8. LIMERICK—
Ranunculus trichophyllus, 209.
Fumaria capreolata, 252.
 Boræi.
 **Hesperis matronalis*.
 **Lepidium Draba*.
Viola palustris, 249.
 silvestris, 249.
Montia fontana, 249.
Rhamnus catharticus, 209.
Rubus infestus, 250.
Rosa hibernica, 250.
Anthriscus vulgaris, 209.
 †*Galium Mollugo*, 209, 251.
 **Matricaria discoidea*, 253.
Hieracium murorum.
 **Tragopogon porrifolius*, 250.
- Vaccinium Oxycoccus, 209.
 Myosotis repens, 250.
 **Solanum nigrum*, 252.
Veronica hederæfolia, 209, 250.
 **Orobanche minor*, 252.
Stachys arvensis, 250.
 ‡*Ballota nigra*, 209.
Juniperus nana, 252.
Carex curta, 252.
 strigosa, 251.
 Hornschuchiana, 252.
Milium effusum, 251.
Poa nemoralis, 209.
 ‡ *compressa*, 209.
Glyceria plicata, 252.
Agropyron pungens, 251.
Equisetum variegatum, 252.
9. CLARE—
Ranunculus Auricomus.
Fumaria Boræi.
Nasturtium sylvestre, 209.
Viola tricolor.
Vicia angustifolia.
 Potentilla procumbens.
 **Sedum album*, 209.
Pinguicula grandiflora, 269.
Mentha sativa.
Galeopsis versicolor.
10. TIPPERARY N.—
Ononis arvensis.
Lithospermum officinale.
 Scutellaria galericulata.
 Allium ursinum.
11. KILKENNY—
Ranunculus trichophyllus.
12. WEXFORD—
Fumaria purpurea.
17. GALWAY N.E.—
Rosa mollis.
Fumaria officinalis.
18. KING'S Co.—
Fumaria officinalis.
19. KILDARE—
Ranunculus Lenormandi.
Viola palustris.
Polygala serpyllacea.
 Sempervivum tectorum.
 Polygonum Hydropiper.
 Juncus squarrosus.
21. DUBLIN—
Fumaria purpurea, 186.
 **Lepidium Draba*, 187.
 **Trifolium agrarium*.
 **Sedum album*, 187.
 Callitriche obtusangula, 187.
 Arctium Newbouldii.
 Hieracium sciaphilum, 247.
 Vaccinium Oxycoccus, 189.
 Lysimachia Nummularia, 190.
 Utricularia vulgaris, 190.

22. MEATH—
Anemone nemorosa.
 **Trifolium agrarium.*
Potentilla procumbens,
Callitriche autumnalis.
Solidago Virgaurea.
Jasione montana.
23. WESTMEATH—
*Fumaria officinalis.**
*Rosa mollis.**
*Callitriche vernalis.**
24. LONGFORD—
 †*Brassica nigra, 270.*
Arctium Newbouldii.
27. MAYO W.—
 **Chelidonium majus, 269.*
Cochlearia danica, 285.
 **Lepidium Draba, 269.*
Cakile maritima, 269.
Silene acaulis, 284.
Stellaria Holostea, 269.
Saxifraga decipiens, 284.
 **Sempervivum tectorum, 269.*
Asperula odorata, 269.
Arctium Newbouldii, 289,
Hieracium hypochæroides, 284.
Orarium, 311.
 **Campanula rapunculoides, 269.*
28. SLIGO—
Ranunculus circinatus, 270.
Auricomus, 270.
 †*Brassica Rapa v. Briggsii, 270.*
Senecio Coronopus, 270.
Spergularia rupestris.
Hypericum humifusum, 270.
Vicia angustifolia, 270.
 **Sempervivum tectorum, 270.*
Cicuta virosa, 270.
 **Matricaria discoidea, 270.*
 †*Anthemis Cotula, 270.*
 **Tanacetum vulgare, 270.*
 **Mimulus guttatus, 270.*
- Stachys arvensis.*
Lamium intermedium.
Teucrium Scorodonia.
Polygonum minus.
Orchis mascula.
Allium ursinum.
Luzula maxima.
- Callitriche stagnalis.**
 Anchusa sempervirens.
Pinguicula lusitanaica.
*Mentha sativa.**
- Galeopsis versicolor, 270.*
Bromus mollis, 270.
Agropyron repens, 270.
- Solanum Dulcamara, 269.*
Veronica hederæfolia, 269.
Lamium hybridum, 280.
Beta maritima, 280.
Atriplex hastata, 287.
Polygonum Raii, 269.
 **Iris fætidissima, 269.*
Festuca Myuros, 269.
Bromus asper, 269.
Agropyron repens, 288.
Aspidium aculeatum, 288.
Ophioglossum vulgatum, 288.
Equisetum maximum, 269, 288.
- Veronica hederæfolia, 270.*
Lycopus europæus, 270.
Ulmus montana, 270.
 ‡*Salix fragilis, 270.*
Empetrum nigrum, 270.
Potamogeton obtusifolius, 270.
Carex curta, 270.
extensa, 270.
paludosa, 270.
Phleum pratense, 270.
Glyceria maritima, 270.
Triticum caninum, 270.
Equisetum maximum, 270.

29. J.EITRIM—
Brassica alba, 270.
 **Trifolium hybridum*, 270.
Gnaphalium sylvaticum.
 **Tanacetum vulgare*, 270.
30. CAVAN—
Vicia hirsuta.
Callitriche autumnalis.
 ‡*Valerianella Auricula*.
 **Tanacetum vulgare*.
Lathyrus macrorrhizus, 270.
 ‡*Smyrniolum Olusatrum*, 270.
Salix repens, 270.
Botrychium Lunaria, 270.
Vaccinium Oxycoccus.
Lithospermum officinale.
Orchis pyramidalis.
Carex teretiuscula.
limosa.
31. LOUTH—
Fumaria confusa.
32. MONAGHAN—
Anthyllis Vulneraria, 270.
33. FERMANAGH—
Brassica alba, 270.
 **Petasites fragrans*, 270.
Origanum vulgare, 270.
34. DONEGAL, E.—
Arctium Newbouldii.
36. TYKONE—
Ranunculus Auricomus.
37. ARMAGH—
Arctium Newbouldii.
38. DOWN—
Geranium columbinum, 262.
 **Galium Mollugo*, 271.
 ‡*Valerianella Auricula*, 263.
 **carinata*.
Hieracium Sommerfeltii, 311.
rivale, 311.
 **Tragopogon porrifolius*.
 **Plantago media*, 271.
 **Chenopodium rubrum*, 263.
Juncus tenuis, 108.
Carex divulsa, 264.
Glyceria festucaeformis, 264.
plicata, 264.
Lastrea spinulosa, 264.
39. ANTRIM—
Ranunculus circinatus, 247.
Crithmum maritimum, 245.
Arctium Newbouldii.
 **Tragopogon porrifolius*.

The above list answers the question—What plants have been added to the flora of any Division during the year? A question which arises equally frequently is—What plants have had their range extended during the year? This is answered by the following list, which shows the new county records arranged under species in the natural order, the numbers appended representing the Divisions to which the plants have been added.

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|--|-----------------------------------|
| <i>Anemone nemorosa</i> , 22. | <i>Fumaria pallidiflora</i> , 8. |
| <i>Ranunculus circinatus</i> , 28, 39. | <i>Boræi</i> , 4, 6, 8, 9. |
| <i>trichophyllus</i> , 8, 11. | <i>purpurea</i> , 1, 2, 12, 21. |
| <i>Drouetii</i> , 1. | <i>confusa</i> , 31. |
| <i>heterophyllus</i> , 2. | <i>officinalis</i> , 18, 23. |
| <i>Lenormandi</i> , 19. | <i>Nasturtium sylvestre</i> , 9. |
| <i>Auricomus</i> , 9, 28, 36. | <i>Cochlearia danica</i> , 2, 27. |
| * <i>Chelidonium majus</i> , 27. | * <i>Hesperis matronalis</i> , 8. |

- ‡*Brassica Rapa*, var. *Briggsii*, 28.
 ‡ *nigra*, 24.
 alba, 29, 33.
 **Diploxys muralis*, 2.
Senebiera Coronopus, 28.
 **Lepidium Draba*, 8, 21, 27.
Cakile maritima, 27.
Silene acaulis, 27.
Stellaria Holostea, 27.
Spergularia rupestris, 28.
Montia fontana, 8.
Viola palustris, 8, 19.
 silvestris, 8.
 tricolor, 9.
Polygala serpyllacea, 19.
Hypericum humifusum, 28.
Geranium columbinum, 38.
Rhamnus catharticus, 8.
Ononis arvensis, 10.
Anthyllis Vulneraria, 32.
 **Trifolium hybridum*, 29.
 **agrarium*, 21, 22
Vicia hirsuta, 30.
 angustifolia, 9, 28.
Lathyrus macrorrhizus, 29.
Rubus pulcherrimus, 1.
 argentatus, 2.
 iricus, 1.
 pyramidalis, 1.
 infestus, 8.
Potentilla procumbens, 1, 9, 22
Rosa hibernica, 8.
 mollis, 17, 23.
Saxifraga decipiens, 27.
 **Sempervivum tectorum*, 19, 27, 28.
 **Sedum album*, 9, 21.
Callitriche vernalis, 23.
 stagnalis, 23.
 obtusangula, 1, 21.
 autumnalis, 22, 30.
Cicuta virosa, 28.
 ‡*Smyrniolum Olusatrum*, 29.
Crithmum maritimum, 39.
Anthriscus vulgaris, 8.
 †*Galium Mollugo*, 8, *38
 **Valerianella carinata*, 2, 38.
 ‡*Auricula*, 30, 38.
 Asperula odorata, 27.
Solidago Virgaurea, 22.
Gnaphalium sylvaticum, 29.
 ‡*Anthemis Cotula*, 28.
 **Matricaria discoidea*, 2, 8, 28.
 **Tanacetum vulgare*, 28, 29, 30.
 **Petasites fragrans*, 33.
Arctium Newbouldii, 3, 21, 24, 27,
 34, 37, 39.
 **Crepis biennis*, 2.
Hieracium Sommerfeltii, 38.
 hypochæroides, 27.
 rivale, 38.
 murorum, 8.
 Orarium, 27.
 sciaphilum, 21.
 **Tragopogon porrifolius*, 5, 8, 38,
 39.
Jasione montana, 22.
 **Campanula rapunculoides*, 27
Vaccinium Oxycoccus, 8, 21, 30.
Lysimachia Nummularia, 21.
Centunculus minimus, 2.
 **Anchusa sempervirens*, 23.
Myosotis repens, 8.
Lithospermum officinale, 10, 30.
 **Cuscuta Trifolii*, 1
 **Solanum nigrum*, 8.
 Dulcamara, 27
 **Mimulus guttatus*, 28.
Veronica hederæfolia, 8, 27, 28.
 **Orobanche minor*, 8.
Utricularia vulgaris, 21
Pinguicula grandiflora, 9.
 lusitanica, 23.
Mentha sativa, 9, 23.
Origanum vulgare, 33.
Scutellaria galericulata, 10.
Lycopus europæus, 28.
Stachys arvensis, 8, 22.
Galeopsis versicolor, 9, 24.
Lamium intermedium, 22.
 hybridum, 27.
Teucrium Scorodonia, 22.
 ‡*Ballota nigra*, 8.
 **Plantago media*, 38.
Chenopodium rubrum, 38.
Beta maritima, 27.
Atriplex hastata, 27.

- | | |
|------------------------------|----------------------------|
| Polygonum Raii, 27. | Carex paludosa, 28. |
| Hydropiper, 19. | Milium effusum, 8. |
| minus, 22. | Phleum pratense, 28. |
| Ulmus montana, 28. | Poa nemoralis, 8. |
| †Salix fragilis, 28. | †compressa, 8. |
| repens, 29. | Glyceria plicata, 8, 38. |
| Empetrum nigrum, 28. | maritima, 28. |
| Juniperus nana, 8. | festucæformis, 38. |
| Orchis pyramidalis, 30. | Festuca Myuros, 27. |
| mascula, 22. | Bromus asper, 27. |
| latifolia, 1, 2. | *secalinus, 2. |
| Ophrys apifera, 2. | racemosus, 1. |
| Allium ursinum, 10, 22. | *commutatus, 2. |
| *Iris foetidissima, 27. | mollis, 24. |
| Juncus squarrosus, 19. | Agropyron caninum, 28. |
| tenuis, 38. | repens, 24, 27. |
| Luzula maxima, 22. | pungens, 8. |
| Lemna gibba, 7. | Aspidium aculeatum, 27. |
| Potamogeton plantagineus, 2. | Lastrea spinulosa, 38. |
| obtusifolius, 28. | Ophioglossum vulgatum, 27. |
| Carex teretiuscula, 30. | Botrychium Lunaria, 29. |
| divulsa, 38. | Equisetum maximum, 27, 28. |
| curta, 8, 28. | trachyodon, 2. |
| limosa, 30. | variegatum, 8. |
| strigosa, 8. | Chara polyacantha, 2. |
| Hornschuchiana, 8. | Tolypella glomerata, 2. |
| extensa, 28. | |

As was the case last year, the additions are far too numerous to allow of a complete summary being given of their localities. With the help of the numbers appended to the list given on pp. 5-7, the particulars of those new county records which have been published can be easily obtained. The annotated list which follows deals with the unpublished material, and is confined to new county records, and to species for which only a single record for the division previously existed, or for which there were only old records, the confirmation of which was desirable. The new records are distinguished by having the name of the division printed in SMALL CAPITALS.

Thalictrum flavum, L.

8. Limerick. Askeaton, '03—Miss Knowles.

Anemone nemorosa, L.

22. MEATH. Athboy—Lilly.

Ranunculus trichophyllus, Chaix.

8. LIMERICK. Ferrybridge on R. Maigue, '03—P.

11. KILKENNY. Quarries near Kilkenny, '03—P.

28. SLIGO. Feenagh Lough, '03—P.

R. penicillatus, Dum.

31. Louth. Fane River, '03—P.

32. Monaghan. Fane River, '03—P.

R. Lenormandi, F. Schultz.

19. KILDARE. Near Brittas, '03—P.

R. Auricomus, L.

9. CLARE. Parteen, '03—R. D. O'Brien.

36. TYRONE. Strabane Glen, '03—Mrs. Leebody

Fumaria Boræi, Jord.

2. Kerry N. Headford (E. S. Marshall)—H. W. Pugsley.

6. WATERFORD. Cappelquin (*Herb. Brit. Mus.*)—H. W. Pugsley.

8. LIMERICK. Near Limerick, '92—H. & J. Groves.

9. CLARE. Parteen, '03—Miss Knowles.

F. purpurea, Pugsley.12. Wexford. East of Wexford, '97 (E. S. Marshall)—*Herb. Groves.***F. confusa**, Jord.

8. Limerick. Foynes, '03—Miss Knowles.

24. Longford. Ballymahon, '00—P.

31. LOUTH. Boyne-mouth, '96—P.

F. officinalis, L.

18. KING'S CO. Edenderry, '96—P.

Nasturtium sylvestre, R. Br.

9. CLARE. Parteen, '03—P.

Sisymbrium Thalianum, J. Gay.

10. Tipp. N. Ballina, '03—P.

Brassica nigra, Koch.

8. Limerick. †Quarry 2 miles S. of Limerick, '03—P.

Raphanus Raphanistrum, L.

28. Sligo. Ballymote, '03—P.

Viola palustris, L.

19. KILDARE. Above Kiltel, '03—P.

Polygala serpyllacea, Weihe.

8. Limerick. Castleconnell, '03—P.

19. KILDARE. Above Kiltel, '03—P.

Cerastium tetrandrum, Curt.

8. Limerick. Lough Gur, '03—P.

Sagina maritima, Don.

28. Sligo. Mullaghmore, '03—P.

Spergularia rupestris, Lebel.

28. SLIGO. Mullaghmore abundant, '03—Hon Mrs. Wynne!

Linum angustifolium, Huds.

8. Limerick. Askeaton, '03—P.

Geranium columbinum, L.

22. Meath. In old stony hedgebanks as well as cultivated fields at Moynalty! for 40 years past—Barnes.

Rhamnus catharticus, L.

8. LIMERICK. Hedges west of Adare, '03—P.

Ononis repens, L.

10. TIPPERARY N. Brockagh near Borrisokane—Lilly.

***Medicago sativa**, L.

8. Limerick. Curragh Chase, '03—P.

***Trifolium agrarium**, L.

21. DUBLIN. By the Dodder near Templeogue, 97—P.

22. MEATH. Meadows at Moynalty, '03, Oldcastle, '96—P

Vicia hirsuta, Koch.

30. CAVAN. North-west of Oldcastle, '03—Barnes!

Potentilla procumbens, Sibth.

9. CLARE. Near Ennistymon, '03—R. A. Phillips.

22. MEATH. Common in Moynalty district, '03—P

Sempervivum tectorum, L.

19. KILDARE. Near Killeel, '03—P.

Myriophyllum spicatum, L.

22. Meath. Breakey Lough, '03—P.

30. CAVAN. Mullagh Lough, '03—P.

Callitriche autumnalis, L.

22. MEATH. Breakey Lough, '03—P.

30. CAVAN. Mullagh Lough, '03—P.

Chærophyllum temulum, L.

18. King's Co. Near Birr, '03—R. A. Phillips.

Anthriscus vulgaris, Pers.

8. LIMERICK. Askeaton, '03—P.

Ænanthe crocata, L.

28. Sligo. Mullaghmore, '03—P.

***Sambucus Ebulus**, L.

28. Sligo. Near Hazlewood, '03—P.

†Gallum erectum, Huds.

8. Limerick. Adare, '03—P.

Valerianella oltoria, Pollich.

8. Limerick. Lough Gur and Askeaton, '03—P.

†V. Auricula, DC.

30. CAVAN. †Near Mullagh, '03—P.

Solidago Virgaurea, L.

22. MEATH. Slievenacalligh—Lilly.

Gnaphallum sylvaticum, L.

29. LEITRIM. Lough Rynn, '03—Mrs Clements!

Bidens cernua, L.

28. Sligo. Bogs south of Kesh, '03—P.

B. tripartita, L.

22. Meath. Mullagh Lough, '03—P.

***Tanacetum vulgare**, L.

30. CAVAN. ‡Mullagh, '03—P.

Carlina vulgaris, L.

22. Meath. Cullendragh townland near Oldcastle, '03—Barnes.

Arctium Newbouldii, Ar. Benn.

- 21. DUBLIN. Near Edmundstown, '03—P.
- 24. LONGFORD. Elfeet Bay on L. Ree, '00—P.
- 34. DONEGAL E. Culdaff, '03—Mrs. Leebo ly.
- 39. ANTRIM. Gobbins, '03—P.

Carduus pycnocephalus, Jacq.

- 8. Limerick. Grange, '03—P.
- 30. CAVAN. Near Virginia, '03—Barnes.

C. crispus, L.

- 8. Limerick. Grange, '03—P.

Cnicus pratensis, L.

- 20. Wicklow. East base of Dowry, '03—P. The only previous records were Glencree (Mackay *Cat.*, 1825) and Lough Bray (*Irish Flora*, 1833).

***Crepis blennis**, L.

- 8. Limerick. Ferrybridge, Adare, Friarstown, '03—P.

C. paludosa, Moench.

- 9. Clare. Parteen, '03—P.

Hieracium murorum, L. pt., var. **leptostodes**, Johanss.

- 8. LIMERICK. Adare Manor abundant, '03—Miss Knowles and Canon O'Brien.

Jasione montana, L.

- 22. MEATH. Slievenacalliagh—Lilly.

Vaccinium Oxycoccus, L.

- 8. LIMERICK. Castleconnell bog, '03—W. Fogerty and P.
- 30. CAVAN. Bogs S. of Mullagh, '03—P.

Erica cinerea, L.

- 23. Westmeath. Bogs near Rathowen—Lilly.

Lysimachia nemorum, L.

- 22. MEATH. By an error, a Meath record for this plant (Moynalty, '02—Barnes!) is attributed to *L. vulgaris* in the annotated list in my 1902 paper (p. 33), though correctly given in the list of county additions (p. 27). Lough Bawn—Lilly.

Lithospermum officinale, L.

- 10. TIPPERARY N. Near Roscrea, '03—R. A. Phillips.
- 30. CAVAN. Crover Castle Island on L. Sheelin, '03—Barnes!

***Orobanche minor**, Sutt.

- 22. Meath. ‡Moynalty, '03—Barnes!

Utricularia minor, L.

- 22. Meath. Breakey Lough, '03—P.

Pinguicula lusitanica, L.

- 23. WESTMEATH. Lisclogher bog—Miss Reynell.
- 33. FERMANAGH. Carrick Lake, '03—Mrs. R. Ll. Praeger!

Scutellaria galericulata, L.

- 10. TIPPERARY N. Marsh opposite Portumna—Lilly.

Stachys arvensis, L.

- 22. MEATH. Moynalty frequent, '03—Barnes!

Lamium Intermedium, Fr.

22. MEATH. Moynalty, '03—Barnes!

28. Sligo. Mullaghmore, '03—P. A confirmation of Syme's record
(*Flor. Ulst.*, 1864).**Teucrium Scorodonia**, L.

22. MEATH. Near Oldcastle—Lilly.

‡**Ballota nigra**, L.

8. LIMERICK. ‡Lough Gur, '03—P.

Polygonum Hydropiper, L.

19. KILDARE. Near Killeel, '03—P.

P. minus, Huds.

22. MEATH. Breakey Lough, '03—P.

30. Cavan. Mullagh L. abundant, '03—P.

Taxus baccata, L.

28. Sligo. Islets in Lough Gill, '03—P.

Hydrocharis Morsus-ranæ, L.

29. Leitrim. Lough Rynn, '03—Mrs. Clements!

Orchis pyramidalis, L.

30. CAVAN. Two and a half miles N.W. of Oldcastle, '03—Barnes!

O. mascula, L.

22. MEATH. Athboy—Lilly.

Allium ursinum, L.

8. Limerick. Askeaton, '03—P.

10. TIPPERARY N. Borrisokane wood—Lilly.

22. MEATH. Near Julianstown, '03—Barnes! Athboy—Lilly.

28. Sligo. Glencar, '03—P.

Juncus squarrosus, L.

19. KILDARE. Above Killeel, '03—P.

Luzula maxima, DC.

22. MEATH. Bog south of Mullagh, '03—P.

Lemna gibba, L.

7. TIPPERARY S. Pool near Clonmel, '03—R. A. Phillips.

Potamogeton obtusifolius, M. & K.

22. Meath. Breakey Lough abundant, '03—P.

Scirpus sylvaticus, L.

33. Fermanagh. Head of Carrol Glen, '03—P.

Cladium Mariscus, R. Br.

8. Limerick. Frequent in the north.

Carex teretiuscula, Good.

30. CAVAN. South of Mullagh, '03—P.

C. Hudsonii, Ar. Benn.

8. Limerick. Castleconnell, '03—P.

C. pendula, Huds.

8. Limerick. Adare, '03—P.

28. Sligo. Doonally and Drumcliff, '03—P.

C. ilmosa, L.

30. CAVAN. Bogs south of Mullagh, '03—P.

Catabrosa aquatica, Beauv.

8. Limerick. Lough Gur, '03—P.

Poa nemoralis, L.

8. LIMERICK. †Adare, '03—P.

22. Meath. Two stations at Moynalty, '03—P.

†P. compressa, L.

8. LIMERICK. †Dock wall at Limerick, '03—P.

Festuca rottbœllioides, Kunth.

28. Sligo. Mullaghmore, '03—P.

F. sylvatica, Vill.

28. Sligo. Rockwood (= Slish wood), '03—P.

Agropyron repens, L.

24. Longford. Clonfide, '03—Barnes!

Ophioglossum vulgatum, L.

28. Sligo. Glencar, '03—P.

Equisetum hyemale, L.

33. Fermanagh. Carrol Glen, '03—P.

Lycopodium Selago, L.

8. Limerick. Castleconnell bog, '03—P.

MOSS-NOTES FROM NORTH IRELAND.

BY J. H. DAVIES.

It may, perhaps, be not amiss that, by way of continuation of some bryological notes contributed to these pages, I should give here a list of the rarer and more noteworthy North of Ireland mosses that have recently come under observation.

Two of the species enumerated, *Fissidens rufulus* and *Weisia rostellata*, are new to the Irish moss-flora. The latter has already been incidentally mentioned in the *Irish Naturalist*, and is now included in order that the station may be placed on record. The former, *Fissidens rufulus*, a subaquatic moss, is very rare, there being, I believe, only two other British stations—the River Lune in Westmoreland, and the River Wharfe in Yorkshire—and it is, therefore, a welcome addition to the Irish list. Gathered in the River Bann as possible *F. crassipes*, which has yet to be discovered in Ireland, and to which it has a near affinity, subsequent examination led to so much uncertainty that specimens were submitted to Mr. H. N. Dixon, who informed me that it is to be referred to *F. rufulus*, a moss that I had never seen before.

The rediscovery in Ireland of *Fissidens tamarindifolius*, only once before found in our island, and that over a century ago, possessed for me much interest. It is described in Turner's *Muscologia Hibernicæ Spicilegium* (1804) as having been detected in Cullen's Wood, Co. Dublin, by Dr. Whitley Stokes, whose name is botanically perpetuated in *Hypnum* (*Eurhynchium*) *Stokesii*.

In like manner, *Pottia bryoides* and *Weisia crispa*, two other rare species which it has been my fortune to meet with, had not been seen in Ireland for very many years.

Though rare in Ireland—it had been reported from only two other localities in Ulster—it may be confessed that much of the delight in gathering *Fontinalis squamosa* in the River Bann was due to a personal reminiscence. It recalled to mind the first and only other time I had seen it growing. That was in a North Yorkshire moorland beck, now fifty years ago, in the days of youthful botanical ardour, the pleasure being shared by others, who were then my frequent companions on excursions, and whose friendship I yet enjoy. But this is a digression that will, perhaps, be forgiven. Templeton found the plant in 1800 in the River Faughan, Co. Derry. It has often been looked for in the mountain streams of Co. Antrim, where it might be expected, but has never yet been found in that county.

The species and varieties previously unrecorded (save *Weisia rostellata*) for Ireland, Ulster and counties of Ulster, so far as I know, are:—

NEW TO IRELAND.

<i>Dicranum Bonjeani</i> , var. <i>rugifolium</i> .	<i>Fontinalis antipyretica</i> , var. <i>gracilis</i> .
<i>Fissidens rufulus</i> .	<i>Hypnum aduncum</i> , var. <i>laxum</i> .
<i>Weisia rostellata</i> .	<i>H. molluscum</i> , var. <i>condensatum</i> .

NEW TO ULSTER.

<i>Fissidens tamarindifolius</i> .	<i>Leptodontium flexifolium</i> .
<i>Pottia bryoides</i> .	<i>Bryum erythrocarpum</i> .
<i>Barbula lurida</i> .	<i>Hypnum revolvens</i> , var. <i>Cossoni</i> .
<i>B. convoluta</i> , var. <i>sardoa</i> .	

NEW TO COUNTY DOWN.

<i>Dicranella Schreberi</i> (type).	<i>Ephemerum serratum</i> , var. <i>angustifolium</i> .
<i>Fissidens exilis</i> .	
<i>Orthotrichum cupulatum</i> .	<i>Hypnum riparium</i> , var. <i>longifolium</i> .

NEW TO COUNTY ANTRIM.

Hypnum chrysophyllum.

NEW TO COUNTY TYRONE.

Eurhynchium murale.

It may be added that the nomenclature and arrangement employed in my short list are those adopted by Mr. Dixon in his *Student's Handbook of British Mosses*, of which indispensable work a new edition is shortly to be expected.

Pleuridium axillare, Lindb.—Near Lisburn, Co. Antrim, and in many places by stream-sides and on damp banks about Lenaderg, Co. Down. Some stems were gathered with two or three capsules, one above another, due to successive innovations, the lower capsules then having the appearance of being lateral. Believed to be rare in Ireland, but likely sometimes overlooked.

P. alternifolium, Rabenh.—In a sandy field, Lenaderg, Co. Down.

Dicranella rufescens, Schp.—Clayey ground, Lenaderg, Co. Down.

D. Schreberi, Schp.—With the last species.

Dicranoweisia cirrata, Lindb.—A moss thought to be rare in Ulster, but plentiful on trees about Lenaderg, Co. Down, as it is found to be in other parts of the county, as also in Co. Antrim.

Dicranum Bonjeani, De Not., var. ***rugifolium***, Bosw.—Spongy bogs on White Mountain, Co. Antrim. A variety characterised by very rugose foliage.

Fissidens exilis, Hedw.—Damp banks, Lenaderg, Co. Down.

F. tamarindifolius, Wils. (*F. incurvus* var. *tamarindifolius* Braithw.)—With *Anthoceros punctatus* on clayey ground in shady places, Lenaderg, Co. Down. It may be stated that the singular fructification of the Hepatic here mentioned, which is rare in Ulster, is to be seen at all seasons of the year.

F. rufulus, B. & S.—On stones, usually submerged, in the River Bann at Lenaderg, Co. Down. Regarding this, Mr. Dixon remarks:—"Your *F. rufulus* has less of the reddish tinge usual in that species, and the leaf-border is less strong; otherwise it agrees well with the Yorkshire plant, which has been accepted as that."

Grimmia apocarpa, Hedw., var. ***rivularis***, W. & M.—Abundant on submerged rocks in River Bann, Lenaderg, Co. Down. A variety with an aspect of var. *alpicola*, and may prove to be that, but in the absence of fruit it is safest to refer here.

- Pottia bryoides**, Mitt.—Amongst old mortar in waste ground, Lisburn, Co. Antrim. A rare moss for which only one other Irish station is known, that being in Co. Dublin.
- P. intermedia**, Fühnr.—On decayed thatch, Corbet, Co. Down. Growing in wide patches, and so abundantly as almost to conceal the old thatch of the deserted cottage on which it occurs. A moss perhaps not well understood with us, and of whose Irish distribution little seems to be known. Some localities are given in *Fl. N.E.I.*, but Moore, in his *Synopsis*, under *P. truncatula*, passes it by with the remark—" *Gymnostomum intermedium*, of Turner, is supposed by Mitten to be a gymnostomous state of *P. lanceolata*"; and, though possibly not infrequent, *P. intermedia* is not mentioned in any of the three lists of Irish mosses that have recently appeared in the *Journal of Botany*.
- P. minutula**, Fühnr.—On bare ground, Lenaderg, Co. Down. Rare in Ireland, but perhaps sometimes passed over. When in fruit in August the reddish appearance of the little tufts of this moss at once catches the eye. The time of fruiting is usually stated as winter and spring.
- Tortula marginata**, Spruce.—On red sandstone walls at Dunmurry, Co. Antrim, where I had the pleasure of pointing it out to Mr. Stewart and the Rev. C. H. Waddell. The locality is about three miles from its only other station in Ireland.
- Barbula lurida**, Lindb.—Wall-top by the Newry Canal at Scarva, Co. Down. As an Irish plant, heretofore known only from Cork and Kerry.
- B. rigidula**, Mitt.—Frequent on walls about Lenaderg, Co. Down.
- B. vinealis**, Brid.—As was expected, this proves to be much less rare in the North-east than it was previously known to be. It is most frequent about Lisburn, Co. Antrim, and is very abundant on the north walls of the Lisburn Cathedral.
- B. convoluta** Hedw. var. β **sardoa**, B. & S.—On a damp wall by the towing path of the Lagan Canal, near the old corn-mill at Lisburn, Co. Antrim. Previously reported for Ireland only from Co. Dublin (Dr. Taylor). A very distinct variety that has been accorded specific rank by various authors. It equates with *Trichostomum undatum* Schp., and *Barbula commutata* Juratz.
- Leptodontium flexifolium**, Hpe.—Plentiful (in company with *Ditrichum flexicaule*) amongst the Portstewart sandhills, Co. Derry. Seems to be very rare in Ireland.
- Weisia crispa**, Mitt.—On rather sandy ground by the approach to the gravel pits at Fairy Well, Lisburn, Co. Antrim. In the only two Irish localities that have been recorded—near Belfast (Templeton), and Kilcullen Bridge, Co. Kildare (R. Brown) (the latter locality noted in Braithwaite's *Brit. Moss-Flora*, but unknown to Dr. Moore)—it has not been seen, I think, for more than a hundred years.
- W. rostellata**, Lindb.—On a raised ditch-bank by the side of the field-path as you go from Ballymacash to Knockmore, near Lisburn, Co. Antrim. The only Irish station.

- Zygodon viridissimus**, Brown.—*C. fr.* at Lenaderg, Co. Down. Frequent throughout the district examined, alike on walls and trees, but usually infertile.
- Orthotrichum cupulatum**, Hoffm.—Lenaderg and Moyallon, Co. Down.
- O. rivulare**, Turn.—Trees by R. Bann, Knocknagor, Co. Down. Seems to be rare in Ireland.
- O. stramineum**, Hornsch.—Alder and Sycamore, by the Newry Canal at Scarva, and by the R. Bann at Laurencetown, Co. Down.
- O. tenellum**, Bruch.—With the last near Laurencetown. In the North this species has so far been observed only in Co. Down.
- O. pulchellum**, Smith.—Frequent about Lenaderg, Co. Down.
- Ephemerum serratum**, Hpe. var. **angustifolium**, B. & S. (*E. minutissimum*, Lindb.)—Ravarnette, Co. Down, and in several spots about Lenaderg, in the same county, being very abundant in a field called the Round Hill, at the latter place. In Ireland known only from Antrim and Down.
- Funaria fascicularis**, Schp.—Sparingly in damp fields, Lenaderg, Co. Down.
- Leptobryum pyriforme**, Wils.—Moist ground by the Lagan Canal above Lisburn, Co. Antrim. Mr. Stewart notes this in *Flora North-east Ireland*, as "very rare," and in open places it seems to be so. Indeed it appears to have been reported from only one other such situation. But, as is known, the plant is not infrequent on flower-pots and damp walls in green-houses. I have seen it in several, amongst others in those of my friends Mrs. J. S. Brown, Edenderry House, Shaw's Bridge, Co. Down; John Brown, F.R.S., Longhurst, Dunmurry, Co. Antrim; and it is very abundant and fruits freely in my greenhouse at Lenaderg.
- Bryum erythrocarpum**, Schwgr.—*C. fr.* in damp, sandy ground at Fairy Well, Lisburn, Co. Antrim. A plant, specimens of which I have seen, supposed to belong here, was some years ago gathered by Rev. R. C. Bindley in Co. Down, but in the absence of fruit it could not be accepted with certainty. It appears remarkable that this rather widely diffused moss should not before have had a place in the Ulster list. It may, however, easily escape recognition when capsules are not present.
- Fontinalis antipyretica**, L., var. **gracilis**, Schp. (*F. gracilis*, Lindb.)—In the R. Bann, above the old mill at Corbet (Tully-connaught), Co. Down. Both the type and *F. squamosa* occur at the same place, and from both, when seen growing, by its hue and general aspect, the variety is easily distinguished.
- F. squamosa**, L.—With the last, and on granite in the Bann at Ballyroney, Co. Down.¹ *C. fr.*, July 12th, 1902.

¹ Since this was written, Mr. S. A. Stewart has informed me that in 1900 he gathered *Fontinalis squamosa* in the Bann above Hilltown, some miles beyond Ballyroney.

Cryphœa heteromalla, Mohr.—On stones, Dunmurry, Co. Antrim, and in a like habitat at Moyallon, Co. Down. These are very rare, and, so far as I know, the only instances of this distinctly arboreal moss ever being rupestral. In its accustomed habitat the plant is not infrequent.

Cylindrotheclum concinnum, Schp.—Plentiful amongst the Portstewart sandhills, Co. Derry. Revs. C. H. Waddell and Canon Lett lately met with this at the Magilligan sandhills in the same county, but it seems to be rare in Ireland.

Eurhynchium Swartzii, Turn.—Frequent in West Down.

E. pumilum, Schp.—Also frequent in West Down. An unusual aquatic form occurs in the R. Bann at Lenaderg.

E. murale, Milde.—Damp walls, Coalisland, Co. Tyrone.

Plagiotheclum Borrerlanum, Spruce.—Rather frequent in woods at Lenaderg, Co. Down.

Amblystegium irriguum, B & S.—Stream flowing into the R. Bann at Lenaderg, Co. Down.

A. fluvatile, B. & S.—In the Bann in several places, where the river has a rocky bed and a swift current, between Ballyroney and Knocknagor, Co. Down.

Hypnum riparium, L. var. **longifolium**, Schp.—Abundant in the R. Bann at Lenaderg, Co. Down. An aquatic variety, I think only once before recognised in Ireland. It was gathered in the north by Mr. Stewart, he believes in Co. Antrim, but cannot now name the locality, the label of his specimens having been lost.

H. chrysophyllum, Brid.—Very plentiful near Fairy Well, Lisburn, Co. Antrim.

H. aduncum, Hedw., var. **laxum**, Schp. (Group *pseudofluitans*, Sanio).—Floating in a pond at Derriaghy, Co. Antrim, and submerged in a pond at Laurencetown, Co. Down.

H. revolvens, Sw., var. **Cossoni**, Ren. (*H. Cossoni*, Schp.).—Boggy ground, moor-top above Colin Glen, Co. Antrim.

H. cupressiforme, L., var. **elatum**, B. & S.—Portstewart sandhills, Co. Derry.

H. molluscum, Hedw., var. **condensatum**, B. & S.—On stones in boggy ground, White Mountain, Co. Antrim.

Lenaderg House, Banbridge.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Golden Eagle from Mr. J. P. Porter (this interesting bird, originally obtained on Achill, has been in the donor's possession for twenty-five years), a Hare from Mr. E. Heron, a Grass Snake from Mr. F. W. Burbidge, a Rhesus Monkey from the Countess of Kilmorey, and a Suricate from Mr. T. Carter. The Raccoon, which had previously escaped from the enclosure and taken refuge in the Lion House, again acted in the same way, and for more than a month remained by day sheltered beneath the eaves, coming down each evening in search of food, until she was captured by the night watchman and restored to her comrades.

DUBLIN MICROSCOPICAL CLUB.

NOVEMBER II.—The Club met at Leinster House.

F. W. MOORE exhibited sections through the flower of *Masdevallia melanoxantha*. This rare Orchid is a native of Ocana, South America, and up to recent years had only been known from dried specimens. It had been confused with *Masdevallia Schlimii*, which, however, is quite distinct, until living plants were introduced by Mr. Sander. The united sepals are large, and of a deep blackish-brown colour, the surface being covered over with a series of minute warts and ridges, the cells of which contain the colouring material.

G. H. CARPENTER showed a dissection of the head of the small myriapod *Scolopendrella immaculata*, demonstrating the existence of mandibles, maxillulæ, and two pairs of maxillæ, and proving thereby the close correspondence between the head of this creature and that of the lowest insects (*Collembola* and *Thysanura*). The further agreement of the primitive insects with *Scolopendrella* in the trunk segmentation, and the evident relationship between *Scolopendrella* and the Centipedes and Millipedes suggests that *Scolopendrella* may fairly be regarded as approximating to the common ancestors of the Tracheate Arthropoda. The jaws of *Scolopendrella* have been figured by the exhibitor in the *Proc. R. Irish Acad.*, vol. xxiv., Section B, 1903, p. 328.

D. M'ARDLE exhibited *Lepidozia trichoclados*, C. Müll., and *Lepodozia setacea*, Web. The former is now considered to be a good species. A full account, with differential remarks between it and *L. setacea*, with plate, will be found in Herr Müller's paper in *Hedwigia*, 1899, p. 197, and an excellent description of these two hepatics by Mr. Macvicar in the *Journal of Botany*, vol. xl., p. 157, 1902.

On account of the similarity of the leaves of the two plants, *Lepidozia trichoclados* has been frequently overlooked. The distinguishing characters of the two plants were shown under microscopes; in

L. trichoclados the bracts of the female inflorescence are ovate, bidentate with the lobes more or less toothed, and the mouth of the perianth is dentate and closed to a point; while in *L. setacea* the bracts are lacinate and ciliate, and the mouth of the perianth is longly ciliate and widely open. The distribution of *Lepidozia trichoclados* in Ireland is still under investigation; recent research shows it to be found in the following counties—Dublin, Wicklow, Clare, Mayo, Galway, and Sligo.

He also exhibited a drawing of the two plants by W. N. Allen, which delineated their characters. A full account of the distribution, with plate, will be published in the *Irish Naturalist* this year. With regard to the plant exhibited at the previous meeting of the Club as *Jungermania* sp. ? collected by Mr. Hunter on schist rocks, Rathmullan, Co. Donegal, Professor Kaalaas, to whom specimens were sent, writes:—“The most striking character in the plant is the almost rectilineal truncate leaves, which, with regard to their form, are very like those of *Jungermania alpestris*, but it cannot, for many reasons, be referred to that species. In most respects it seems to come near *J. Wenzelii*, which, however, is somewhat larger, and, moreover, an alpine species that is not likely to be met with in Ireland. I do not know any European species to which your plant with certainty can be referred.” Until fertile specimens be found, it will be difficult to settle this question.

W. F. GUNN showed shoots of Gooseberries attacked by the American Gooseberry Mildew, *Sphaerotheca Mors-Uvæ* (Berk. & Curtis), also aslide of same, showing the perithecia or winter fruit of the fungus in situ. This disease, which has proved most disastrous in America, almost prohibiting the cultivation of the fruit in many districts, first appeared in this country in County Antrim, about five years ago. Since then it has been reported in a number of districts throughout the country. The fungus attacks the young foliage and fruits, soon after the buds have burst, covering them with a white cobweb-like mycelium, on which conidia are freely produced. Later in the year the perithecia appear as minute black specks embedded in the mycelium.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

DECEMBER 1.—The President (Professor SYMINGTON, M.D., F.R.S.) in the chair. A lecture was given by Prof. J. W. BYERS, M.D., M.A., on the subject: “Sayings, Proverbs, and Humour of Ulster.”

BELFAST NATURALISTS' FIELD CLUB.

NOVEMBER 17.—The President (W. J. FENNEL) delivered an inaugural address, his subject being “The Club's Builders.” He briefly traced the history of the Club from its foundation on March 6, 1863, and proceeded to refer to some of the members whose influence and work had contributed to the life of the Club during the intervening forty years. Among the members referred to were Canon Grainger, Professor R. Tate, Robert

Patterson, Professor Andrews, W. Swanston, F. W. Lockwood, R. Young, G. V. Du Noyer, Canon McIlwaine, Dr. Holden, Shakespeare Wood, Dr. Thompson, W. J. Knowles, Dr. H. S. Purdon, J. J. Murphy, Professor James Thompson, Joseph Wright, W. Gray, S. A. Stewart, Hugh Robinson, T. H. Keown, W. F. Workman, M. Harbison, T. H. Corry, Charles Elcock, Miss Andrews, Madame Christen, R. Ll. Praeger, J. Vinycomb, J. Starkie Gardner, Robert May, R. M. Young, Rev. C. H. Waddell, J. St. J. Phillips, Robert Patterson, F. J. Bigger, R. Welch.

Five new members were elected.

DUBLIN NATURALISTS' FIELD CLUB.

NOVEMBER 12.—H. J. SEYMOUR, F.G.S., in the chair. G. C. GOUGH, F.G.S., A.R.C.S., Field Club Union Delegate from the Belfast Club, lectured on "Geology and Scenery." The lecture was illustrated by a large series of lantern views of Irish scenery, and the lecturer dealt with the very wide field that pertains to the connection between geological history and geological phenomena, and the face of the country as we now find it. Three new members were elected. The question of Winter Excursions was discussed, and it was decided to hold an excursion on the Saturday preceeding each winter meeting.

DECEMBER 5.—EXCURSION TO THE DINGLE, CARRICKMINES.—Sixteen members and friends left Harcourt-street Terminus, by the 1.30 train, for Carrickmines. They were met on arrival by Mr. Colgan, who guided the party across the fields to the Dingle. This strange trench-like notch, which runs across the brow of one of the foothills of the Three Rock Mountain, and which cannot be attributed in any way to the present drainage system of the Dublin hills, was explained by Dr. Matley as the outlet of a lake formed towards the close of the glacial period between the retreating ice-sheet and the northern slope of the Dublin Mountains. A section of the party descended into the ravine in order to study the immense fallen blocks which are heaped up on its eastern side. The party then walked to Shankill station, where the 5 p.m. train was taken to Dublin.

DECEMBER 8.—The second Winter Business Meeting was held in the Royal Irish Academy. The chair was taken by R. LL. PRAEGER, B.A. After the minutes of the previous meeting had been read and confirmed, the Chairman called for nominations of officers of the Club for the coming year. The following nominations were made:—President, F. W. Burbidge, M.A., F.L.S.; Vice-President, C. B. Moffat; Hon. Sec., F. O'B. Ellison, B.A. Members of Committee—G. W. Lamplugh, F.G.S.; J. A. Clarke.

J. A. CLARKE gave a lecture on "Eyes and their History," explaining the evolution of the eye in a number of the lower forms of life.

R. LL. PRAEGER gave an account of additions to "Irish Topographical Botany" in 1903. This paper will be found in full in this number of the

Irish Naturalist. Mr. Praeger pointed out the necessity of the Club's publishing papers read before it, if it wished to remain a Corresponding Society in connection with the British Association.

Miss A. Frazer and Mr. D. L. Murphy were elected associate members.

LIMERICK FIELD CLUB.

NOVEMBER 5 —ANNUAL MEETING.—The President (P. J. LYNCH, C.E.), in the chair. After an opening address by the President on the work and aims of the Club, J. F. WINDLE, C.E., read the annual report, which contained the following :—

"The Committee are pleased to be able to report that during the past year (the tenth of the Club's existence) there has been an increase in membership, which now stands at 124, as compared with 113 last year.

"Our income this year from all sources, including subscriptions towards defraying the expenses of the Dublin Field Club excursion, amounted to £70 7s. 6d., and our expenditure was £69 15s. 3d.

"The Club Journal was published in August, and a copy sent to each member. The Journal Committee regret they were unable to publish this year all the matter sent in, as they thought it their duty not to enlarge it beyond its present size. During the Winter Session 1902-03 the programme was carried out, the attendance of members being good.

"Our Summer Excursions this year were marked by the visit paid to us by the Dublin Field Club in June, lasting for three days, and carried out most successfully in brilliant weather. Your Committee desire to thank all the members who so liberally subscribed to defray some of the expenses, and regret that more members did not avail themselves of the opportunity of visiting our county in such very pleasant and instructive company. A detailed report of the excursions will be published in our Journal next year.

"Photography.—Your Committee have again to call attention to the falling off of members contributing to our photographic evenings. What was once a flourishing section is now reduced to a few working members. During the year a movement has been started by some of the members of this section to raise a fund to mark the birthplace of our great local antiquary, Eugene O'Curry, at Doonagha. It is hoped that all the members of the Club, with their friends, will unite in bringing it to a successful issue."

Mr. Joseph Stewart read the financial statement, which was satisfactory, showing a balance of £8 5s. 3d. to start the new year with.

The following were elected officers of the Club for the ensuing year :—President—Dr. W. A. Fogerty. Vice-Presidents—P. J. Lynch and J. P. Dalton. Committee—Mrs. Gibson, Miss A. Doyle, Rev. T. Lee, Rev. H. Orpen, B. Barrington, H. V. Moroney, and H. V. Hanna. Hon. Treasurer—Joseph Stewart. Hon. Joint Secretaries—Dr. George Fogerty and J. F. Windle.

A vote of thanks to the outgoing President concluded the business.

REVIEWS.

A SCIENTIFIC DIARY.

Knowledge Diary and Scientific Handbook for 1904. Pp. 108 + 420. London: Knowledge Office, 1903. Price 3s. net.

It gives us pleasure to welcome again this useful and well-compiled handbook, which now makes a regular yearly appearance, and cannot fail to win the support of men of science generally. As usual, much of the information given is concerned with Astronomy, Physics, and Meteorology, but the articles on the Camera applied to Natural History, by R. B. Lodge, and on some uses of the Microscope, by M. I. Cross, will appeal strongly to biological students. Readers of *Knowledge* will regret the resignation by Mr. Cross of the editorship of the microscopical columns of that magazine, but we are glad to learn that his place will be taken by Mr. F. S. Scales, and that further space will be devoted to the subject during 1904.

INSECTS AND THEIR RELATIONS.

On the Relationships between the Classes of the Arthropoda. By GEORGE H. CARPENTER, B.Sc., M.R.I.A. *Proc. R.I.A.* Vol. xxiv. (B) 1903. Pp. 320-360, pl. vi.

The subject of Mr. G. H. Carpenter's paper on the relationship between the classes of Arthropoda, concerns Irish zoologists as much as it does those of other countries, though it does not deal with any peculiarly Irish problems. It is a paper of very unusual merit which will, no doubt, be widely read and appreciated by men of science.

The views as to the origin and relationship of the Classes of Arthropoda, that is to say, of the Spiders, Centipedes, Insects, and Crustaceans, are very divergent. Most zoologists however seem now agreed that crustaceans and insects, at any rate, have developed on totally distinct lines from annelidan ancestors.

Mr. Carpenter takes a completely independent attitude in his argument that the various classes of the Arthropoda are truly related to each other, and that they all must have had jointed-limbed ancestors. From a comparative study of the morphology of the groups, supported by some original and careful dissections of the minute anatomy of the lowest Insects, and also from embryological and palæontological evidence, Mr. Carpenter is able to show an exact agreement in the number of body-segments in the insects, the most primitive Myriapods, the Crustaceans, and the Spiders. Hence he argues that these various classes must be traced back to common arthropodan ancestors with a definite number of segments, and that the views now generally current among zoologists on the subject can no longer be maintained.

R. F. S.

THE LEVINGE HERBARIUM.

The Levinge Herbarium. By Prof. T. JOHNSON, D.Sc., F.L.S., and Miss M. C. KNOWLES. *Sci. Proc. R. Dublin Soc.* v. (u.s.) part I, No. 10, 1903.

We welcome this paper as the first official publication of any portion of the fine collection of Irish flowering plants now gathered together in the National Herbarium, and we sincerely trust it may be looked on as the first of a series dealing with the same subject. Mr. Levinge's researches in Irish botany, and more particularly in the flora of his own county of Westmeath, are well known to readers of this Journal through the papers which he himself contributed to its pages. His Irish herbarium, which suitably finds a resting-place in the National Museum, consists largely of Westmeath plants; the counties of Clare and Dublin are also well represented.

"In the present paper the object is to record the species of which specimens are found in the collection . . . and not yet recorded." Under each species dealt with, after giving the record from the herbarium label (often including valuable comments by critical botanists), the authors add quotations from *Cybele Hibernica* and *Irish Topographical Botany* dealing with the distribution of the plant in question—a delightful convenience for a reader of the paper, but one which, if generally applied, would eventually break the bank of any publishing society; in the present case two-thirds of the matter consists of such extracts.

An examination of the paper shows that the collection, while full of interesting plants, is not so rich in new material for the working out of plant-distribution in Ireland as might have been hoped, considering that Mr. Levinge published only a selection of his notes. The county-records given in the paper number 78. Of these 31 are marked or noted as new county records; but using the standard adopted in *Cybele* and *Irish Top. Bot.*, this list becomes seriously denuded. Eleven of the plants are varieties, of which the species is already on record; four more (*Oxyria digyna* from Clare, and *Ulmus montana*, *Taxus baccata*, and *Polystichum Lonchitis* from Westmeath) cannot be included in the respective county floras, without further information as to their standing; *Erysimum orientale*, *Poterium muricatum*, and *Leonurus Cardiaca* cannot claim even naturalized rank in Ireland; and *Juncus compressus* will hardly be admitted to the Irish flora on the evidence brought forward in this paper, though its eventual admission is quite possible. So that the Levinge herbarium yields us so far twelve new county records—namely, one for Limerick, four for Clare, one for N.E. Galway, and six for Westmeath. The best of these are *Rosa mollis* (N.E. Galway and Westmeath), *Callitriche vernalis* (Westmeath), and *Galeopsis versicolor* (Clare). But while the plunder which the collection yields in the way of new plant-records is small, the possession of such an interesting series of Irish plants, beautifully mounted and arranged, is a thing on which the nation may congratulate itself; and the present paper, by making the riches of the collection more widely known, serves a very useful end, and is a valuable contribution to the detailed working out of the Irish flora.

R. L.L. P.

NOTES.

ZOOLOGY.

Astrorhiza on the Antrim Coast.

A remarkably large specimen of this genus of the Foraminifera was dredged, with other material, in 45 fathoms off Rathlin Island in 1896, but was unfortunately lost among debris in the bottom of the boat as we were examining it. It was overlooked by inadvertance in Mr. Wright's list in this Journal, September 1902. The family *Astrorhizida* has only been discovered in recent years, as its members are mainly deep water forms. They are all arenaceous, the typical form having a test composed of fine sand and mud.

R. WELCH.

Belfast.

Velella spiralis on the Cork coast.

On Saturday, October 10th, a very heavy southerly gale blew with great force during the latter part of the day and following night. The exact locality noticed was west of Cork Harbour, at Myrtleville. The following morning the receding tide left stranded on the rocky shore large numbers of *Velella spiralis* of the usual oval shape, and possessing an oblique cartilaginous crest. The fragile little creatures were broken against the stones, or in some cases deposited high and dry on the grass of the more sloping cliffs. Some few were mere skeletons, but others seemed hardly lifeless. The deep rich blue of their tissue showed up clearly among the stones, and I gathered a large number in a short time.

Will any of our biologist friends say if such an invasion is an unusual occurrence to be placed to the credit of the furious gale, or whether these delicate jelly fish are to be seen off our shores at this time of the year?

HARRIETT A. MARTIN.

Cork, High School.

[Probably this interesting little pelagic siphonophore only occurs on our coasts after a gale from the Atlantic.—EDS.]

Spinther miniaceus in Irish Waters.

I have to record the occurrence of *Spinther miniaceus*, Grube, in two localities in the neighbourhood of Belfast. It was got by dredging parties of the Ulster Fisheries and Biology Association off Whitehead in water 7-10 fathoms deep, and again in water 30 fathoms deep, just

opposite the Gobbins. The genus is a rare one, and the species has not hitherto been recorded from Ireland. Rather curiously, however, the genus was established by Dr. Johnston in 1845 for another species, *S. oniscoides*, that was taken in Belfast Lough by Hyndman, and which has not since been satisfactorily recognised in British waters. *S. miniaceus* is known to occur at Trieste; on the coast of Norway; and in Danish and American waters; but apparently the only British localities hitherto recorded are the Minch (M'Intosh), and Anglesey (Hornell). A full description and coloured figures of the species may be found in M'Intosh's Monograph of the British Annelids.

GREGG WILSON.

Queen's College, Belfast.

Cenistis quadra in Queen's County.

A female specimen of this scarce moth was sent to the Dublin Museum during August by Mrs. Stack, who had found it near Ballylinan, in Queen's County, only a few miles from the border of Co. Kildare. Probably this species will be found to have a fairly wide range in the south of Ireland.

GEO. H. CARPENTER.

Irish Freshwater Mites.

In the *Annals and Magazine of Natural History* (vol. xii., ser. 7, pp. 505-515) and the *Zoologischer Anzeiger* (vol. xxvi., pp. 265-272) for 1903 there are two papers by Mr. J. N. Halbert on Irish Freshwater Mites, with notes and figures of new and rare species. Three genera only are referred to i.e., *Hydrachna*, *Eylais*, and *Arrhenurus*. The two first mentioned are large red mites which may be found swimming actively about amongst weeds in stagnant or slowly-flowing water during the summer months; while the numerous species of *Arrhenurus* are remarkable for great beauty of structure in the males, and their bright colouring—usually some shade of red, blue, or green. The following species are recorded in these genera:—

Hydrachna paludosa, Thon. (new to Britain); *H. scutata*, Piersig; *H. biscutata*, Sig Thor.; *H. incisa* (new species); *H. Leegei*, Koenike; *H. maculifera*, Piersig; *H. dissimilis* (new species); *H. conjecta*, Koenike; *H. globosa*, de Geer; *Eylais hamata*, Koenike; *E. Koenikei* (new species); *E. extendens*, Muller; *E. symmetrica* (new species); *E. neglecta*, Sig Thor.; *E. undulosa*, Koenike; *E. soavi*, Piersig and var. *instabilis* (new variety); *E. triarcuata*, Piersig; *E. unisinuata*, Croneberg; *E. spinipes*, Sig Thor; *E. infundibulifera*, Koenike and var. *stagnalis* (new variety); *E. celtica* (new species).

Arrhenurus globator, Muller; *A. securiformis*, Piersig; *A. cylindricus*, Piersig; *A. caudatus*, de Geer; *A. Freemani* (new species); *A. cuspidifer*, Piersig; *A. Halberti*, Piersig; *A. ornatus*, George; *A. maculator*, Muller;

A. dilatatus (new species); *A. crenatus*, Koenike (new to Britain); *A. tricuspidator*, Muller; *A. claviger*, Koenike; *A. Bruzelii*, Koenike; *A. albator*, Muller; *A. crassicaudatus*, Kramer, *A. Kanei*, Halbt.; *A. sinuator*, Muller; *A. forpicator*, Neuman; *A. solidus*, Piersig; *A. sculptus* (new species); *A. truncatellus*, Muller.

Most of these are widely distributed European species; some, however, are very rare, such as *A. Kanei*, which was dredged in Lough Erne and elsewhere in Ulster. It is nearly related to a Scandinavian species—*A. nobilis*—described by Neuman many years ago from Lake Malar.

Decalcification of Freshwater Shells.

While dredging some years ago for the Fauna and Flora Committee, R.I.A., in the deep hole in Lough Neagh, south of Toome, I noticed in all my hauls, in between about 80 to 96 feet, some curious-looking objects like minute collapsed bladders. They were very numerous, translucent pale brown in colour, and about one quarter of an inch in diameter. These were most puzzling. It was evident they were not the outer cases of fish eggs that had hatched out—they seemed too large for that. I submitted them to various authorities, none of whom could connect them with any likely source. In May this year Mr. J. Pearson and I were dredging in Lough Neagh for the newly-established Biological Laboratory at Larne, and on the margin of the deep rift, in about sixty feet of water, some *Valvata piscinalis* and *Limnæa peregra* came up. These were placed in a deep, wide-mouthed bottle, and, on swirling round, some specimens were noticed in which almost all the shell seemed merely epidermis, with only a small portion of the calcareous part of the shell remaining in the spire. Later, in the deep hole—96 feet—we obtained a few *Bythinia tentaculata*, *Valvata piscinalis*, and abundance of *Sphærium corneum*, of which the epidermis only remained, with a few in which portion of the shell was present. With these were many *Mysis relicta*. This, then, was the explanation of my old finds—they were *S. corneum*, entirely decalcified by acid in the water. This deep hole is a mass of fine black mud, a veritable graveyard of myriads of shells, &c., which live in the neighbourhood, with much decaying vegetable matter and it is evidently the carbonic acid set free from decaying animal and vegetable life that has dissolved the lime of the shells, leaving the epidermis intact. This, as it floats round in water in a bottle, keeps the form of the shell perfectly, especially in the case of the univalves. As the dredge disturbed the bottom mud, masses of bubbles ascended to the surface, doubtless carbonic acid gas. This question, however, we hope to settle definitely on a future visit, with some other faunistic questions connected with this extremely limited deep area of a lough which is very shallow, indeed, when compared with its large size.

R. WELCH.

Belfast.

Temporary disappearance of *Paludestrina ventrosa*.

A few fresh-water shells are known to (seemingly) disappear from their regular habitats some years, and, judging by what I have noticed at Magheramorne, on Larne Lough, this brackish water species might be added to the number. I would, however, like to have the experience of other observers on this point. This particular locality cannot be disturbed by specially high tides.

R. WELCH.

Belfast.

***Cœcilianella acicula* in Ulster.**

On Wednesday, October 14, while driving through part of the limestone district about four miles north of Carrickmacross, I saw at the other side of a field some much-weathered craggy-looking limestone, with some dry banks between the crags that could not be cultivated. I at once said to my companion that I should find *C. acicula* there if it was to be found in the district. Within five minutes, simply by turning over stones, I came across three specimens alive, one full, the other two half grown, adhering to the stone, but none actually on the ground. Under another stone I found three dead shells. As a rule I have found the living specimens adhering to stones when turned up, so I always look carefully at the stone before examining the ground. The limestone in that locality is Upper Limestone. I believe this is the first time this shell has been recorded for Ulster. Thompson's localities mentioned in his *Nat. Hist. of Ireland*, vol. 4, are much further south. In Dr. Scharff's list (*J. N.*, 1892), and the last edition of the Conchological Society's Census, it is not listed from any Ulster county. Dr. Scharff in his notes states that it has seldom been found alive.

P. H. GRIERSON.

Irish Land Commission, Dublin.

The Hawfinch in Donegal.

On Saturday, October 17, I observed a single specimen of the Hawfinch (*Coccothraustes vulgaris*), at Clonmany, Co. Donegal. I was fishing when it lighted on a tree less than twenty yards from me, and remained there for some minutes.

J. R. LEEBODY.

Londonderry.

Bear remains in a Bog.

Two molar teeth and a large canine of a Bear were recently discovered in Donore Bog, Queen's County, by Henry Kenna, of Shanaboe. They were found about seven feet from the surface, in what is known as a "black bog," within a mile and a half from Mountrath station.

Bear remains have so very rarely been met with in Irish bogs that such finds deserve to be specially recorded. The interesting teeth have been presented to the National Museum in Dublin, where they are now preserved.

R. F. SCHARFF.

GEOLOGY.

Cave Exploration in Co. Clare.

At the Southport meeting of the British Association an interesting account of the exploration by the Irish Cave Committee of the Edenvale Caves, Co. Clare, was given by Mr. R. J. Ussher. He stated that in April, 1902, Dr. Scharff and he visited some caves in the Co. Clare, and decided to explore two at Edenvale, near Ennis, which adjoined each other, and proved to be connected. Another system of connected caves was subsequently explored there, and both groups of cavities were found to be prolific in remains of animals now extinct in Ireland, and in human relics of different periods. Edenvale House stands on a ridge of Carboniferous limestone, which forms the western side of a deeply cleft anticlinal; in the chasm thus formed lies a lake of relatively great depth, which is surrounded by a steep declivity on all sides but one. The first two cavities referred to, which have been named the Alice and the Gwendoline caves, open in a low escarpment on the western side of the Edenvale ridge. Their aspect is southerly.

The Alice cave, after running a straight course for eighty feet, was found to terminate in an upward opening that had been filled in with earth and stones, and contained material resembling that found in kitchen middens. At forty feet from the mouth of this cave a gallery branched off, and connected it with the Gwendoline cave on a lower level. At fifteen feet from the mouth of the Alice cave a projection in the rocky wall was worn smooth, as if by the constant rubbing of creatures which had passed in and out. In most parts of these caves two strata were distinguishable:—

1st and upper.—Brown earth, occasionally containing calcareous tufa. In this stratum was found much charcoal, bones of man and domestic animals in a fragmentary state, and also objects of human art of various descriptions—a bone pin or awl, an amber bead, a bracelet of bronze, and another of gold.

2nd.—A lower stratum composed of clay, generally of a yellow-ochre tint, but sometimes purplish.

Bones and teeth of Reindeer and Bear were found chiefly in the latter stratum, and the ursine remains indicated that they belonged to individuals of great size.

Having removed the fossiliferous deposits of the above caves, operations were commenced at the orifice of the second group, opening in the cliff-face under Edenvale House overlooking the lake. This cave runs fifty feet into the rock, but is traversed by a series of galleries, some of which are wide and confluent. One of these galleries was excavated for a distance of sixty feet, and it was found to be crossed by another cave that led out to the cliff, but whose orifice is blocked.

This system of caves is so extensive and complex that it was named the Catacombs. It has proved still more fruitful than the former caves in relics of man and of extinct animals. Human bones were frequent, and in one place an assemblage of these included a cranium,

not far from which there were two stout iron knife-blades. A strap of bronze, bearing a buckle, was found elsewhere, ornamented with an interlaced pattern in silver plating. In other parts of the Catacombs were chipped flint scrapers, a bone piercer, a tusk of a large boar pierced as if to form an amulet, and a marine shell similarly pierced. Several marine shells occurred, although the sea is many miles away from the site; also much charcoal, and bones of Horse, Ox, Pig, Sheep or Goat, and Dog. Bones and teeth of Bear and Reindeer were of daily occurrence in excavating the deposits, and in a few cases pieces of the bones and of the antlers of the Great Irish Deer (Irish Elk) were obtained. The large collections of human and animal remains found in the Edenvale caves are in course of examination, and the further exploration of the Catacombs is in progress, there being reason to believe that the unexplored portions considerably exceed those that have been examined.

During June, July, and August, 1903, Mr. Ussher continued the excavation of the Catacombs at Edenvale for nine weeks; and as the work proceeded fresh galleries were discovered, the entire forming one of the most complex systems of caves known in Ireland. Though the animal remains filled but ten baskets, as against twenty in 1902, the proportion of extinct species was larger.

The Irish Elk was more numerous represented, its larger bones having had their ends broken off, as if to extract the marrow. Remains of Bear and Reindeer were also of frequent occurrence, and in the upper stratum there were many human bones. The Lemming has also been identified by Dr. Scharff among the smaller bones found in the Alice Cave in 1902, and was also obtained this year in the Catacombs; in both cases its remains were in the upper stratum.

Excavations were afterwards commenced in the mouth of a cave at New Hall, near Edenvale; this contained two foot-bones of Bear, as well as remains of man and domestic animals, sea shells, charcoal, hand-made pottery, delicately-pointed bone piercers, carved canines of dog or wolf, and a bronze pin of the ancient type. This New Hall cave proves to be more extensive than was supposed, and awaits further exploration.

NEWS GLEANINGS.

Popular Natural History.

Professor Gregg Wilson, D.Sc., is giving a course of twelve evening lectures on "Marine Zoology" in Queen's College, Belfast. These lectures are open to the public, and Dr. Wilson uses local specimens and examples as much as possible. The working members of the Ulster Fisheries and Biology Association have derived much instruction from these lectures, but the attendance of the public is disappointing.

The Dublin Museum demonstrations are being held as usual during the months of December, January, and February. A full list of the subjects and speakers will be found on the second page of our cover.

A LIST OF THE IRISH FUMITORIES
IN THE HERBARIUM OF
THE NATIONAL MUSEUM, DUBLIN.

BY MISS M. C. KNOWLES.

SINCE the publication of Mr. H. W. Pugsley's paper on the British capreolate Fumitories in the *Journal of Botany*, April, 1902, it has become evident to Irish field botanists that the list of Fumitories recorded from Ireland needs revision. To help with this, last autumn, with Professor Johnson's consent, I wrote to Mr. Pugsley to see if he would be good enough to go through and revise the naming of the Irish specimens in the collections of the National Museum. He very kindly agreed to do this, and these notes are based on the results of his examination.

Of the 102 Irish specimens sent, which comprised those in the herbariums of A. G. More and H. C. Levinge as well as those in the general Irish herbarium, Mr. Pugsley was able to name 84 with certainty, as follows :—29 *Fumaria officinalis*, L., 25 *F. confusa*, Jord., 12 *F. capreolata*, L., 11 *F. Boræi*, Jord., 2 *F. densiflora*, DC., 1 *F. parviflora*, Lam., 4 *F. purpurea*, Pugsley.

Besides these, there are 6 specimens of an ally or variety of *F. confusa* which so far Mr. Pugsley has only seen from Ireland, and about which he says he can come to no definite conclusion until he has seen the plant growing wild. He places it provisionally under *F. confusa*, Jord. as a variety, and in the list these 6 specimens are so placed.

Of the nine specimens in the collections that had been referred to *F. muralis*, Sond., three have been transferred to *F. Boræi*, Jord., four to *F. confusa*, Jord., and two to *F. officinalis*, L. ; and we are left without a single Irish specimen of true *F. muralis*. It will be interesting to see if it grows in Ireland at all. Mr. Pugsley says it is very rare in Britain. Among the large number of Fumitories from Great Britain in this Museum of which Mr. Pugsley has also kindly revised the naming, there is only one specimen of *F. muralis*, Sond., from the herbarium of Dr. Steele.

In making out the list I have followed the plan adopted by Mr. Praeger in his Irish Topographical Botany.

Fumarla capreolata. L.

8. LIMERICK. Gravel-pits, Foynes, October, 1902—Miss O'Brien. Ardanoir, Foynes, June, 1903—M. C. Knowles.
9. CLARE. Aran Islands, Galway Bay, August 19, 1893—P. B. O'Kelly (*Herb.* H. C. Levinge). Great Isle of Aran, Galway Bay, August, 1869—A. G. More (*Herb.* A. G. More). Shady wood, Great Isle of Aran, Galway Bay, July, 1895—Praeger (a weak form).
12. WEXFORD. Near Wexford, June 6, 1897—E. S. Marshall (a somewhat abnormal form).
15. GALWAY S.E. Garden near the school, Castle Taylor, July, 1850—A. G. More (*Herb.* A. G. More).
20. WICKLOW. Roadside, Greystones, June 5, 1894—Praeger.
28. SLIGO. Cultivated ground, Strandhill, August 15, 1897—Praeger.
38. DOWN. Warrenpoint, June, 1887—S. A. Stewart (a coloured form, simulating *F. speciosa*, Jord.). Near Ballynahinch—*Ex Herb.* Trinity College, Dublin.
39. ANTRIM. Carrickfergus, August, 1894—M. C. Knowles.

F. Boraei, Jord.

5. CORK E. Youghal—*Herb.* Miss Ball.
6. WATERFORD. Ardmore, August, 1888—R. J. Ussher.
7. TIPPERARY S. Cultivated ground, Carrick-on-Suir, June 6, 1900—Praeger.
9. CLARE. Parteenalax, September 26, 1903—R. D. O'Brien.
11. KILKENNY. Granny, July 31, 1898—Praeger.
12. WEXFORD. Near Wexford, June 17, 1897—E. S. Marshall. Hedge, Crossbridge cemetery, June 17, 1896—E. S. Marshall.
13. CARLOW. Cultivated ground below St. Mullins (a slender form), and near St. Mullins, August 11, 1898—Praeger. Goresbridge, July 29, 1899—Praeger.
21. DUBLIN. Fields, Portmarnock—D. Moore.
22. MEATH. Cultivated field, Oldcastle, July 18, 1896—Praeger.

F. confusa, Jord.

5. CORK E. Fermoy, 1850—T. Chandlee (*Herb.* T. Chandlee). (Typical.)
6. WATERFORD. Ardmore, August 24, 1880—R. J. Ussher.
8. LIMERICK. Ardanoir, Foynes, June, 1903—Miss O'Brien.
9. CLARE. Corofin, August 7, 1893—H. C. Levinge (*Herb.* H. C. Levinge).
10. TIPPERARY N. Near Nenagh, June 26, 1899—Praeger. Cultivated ground, Cloughjordan, August 12, 1900—Praeger.

15. GALWAY S.E. Kinvarra, July 8, 1900—Praeger. Kılcolgan, August 27, 1899—Praeger (shade form).
17. GALWAY N.E. Cultivated ground, Oranmore, August 24, 1899—Praeger. North of Tuam, July 14, 1899—Praeger. Bellahillan bridge, June 20, 1896—Praeger.
18. KING'S COUNTY. Cultivated ground, Edenderry, July 27, 1896—Praeger (slender form).
20. WICKLOW. Wayside, Bray, July, 1872—*Herb.* Dr. Steele (a shade form). Cultivated ground, Shillelagh, June 3, 1899—Praeger.
21. DUBLIN. Stormstown, August, 1870—*Ex Herb.* Dr. Litton. Glasnevin, November, 1866—Rev. H. G. Carroll.
22. MEATH. Oldcastle, July 18, 1898—Praeger. Slieve Brehgh, July 15, 1900—Praeger.
24. LONGFORD. Ballymahon, August 20, 1900—Praeger.
25. ROSCOMMON. Cultivated ground west of Athlone, July 2, 1899—Praeger. Cultivated ground near Athlone, June 18, 1898—Praeger.
28. SLIGO. Cultivated ground, Strandhill, August 16, 1897—Praeger.
31. LOUTH. Cultivated ground, Dunany, August 30, 1896—Praeger (slender shade form).
36. TYRONE. Strabane, September, 1900—M. C. Knowles. Omagh, July, 1896—M. C. Knowles.
38. DOWN. Saintfield, August, 1893—C. H. Waddell (shade form).

F. confusa, Jord., var.

13. CARLOW. Cultivated ground, Milford, August 9, 1898—Praeger.
18. KING'S COUNTY. Gravel pit, Clara, August 30, 1899—Praeger.
20. WICKLOW. Near Kilcool, July, 1872—*Herb.* Dr. Steele.
21. DUBLIN. Cultivated ground, Royal Canal, Dunsink, June 6, 1894—Praeger.
24. LONGFORD. Granard, May 13, 1899—Praeger.
31. LOUTH. Termonfeckin, August 10, 1896—Praeger.

F. densiflora, DC.

17. GALWAY N.E. Esker four miles N. of Tuam, July 14, 1899—Praeger. Cultivated ground E. of Tuam, July 14, 1899—Praeger.

F. officinalis, L.

5. CORK E. Queenstown, September, 1850—Isaac Carroll (*Herb.* T. Chandlee).
7. TIPPERARY S. Cultivated ground, Slievenaman, June 23, 1900—Praeger. Gravel pit, Vale of Aherlow, June 25, 1900—Praeger. Cultivated ground, Fethard, July 24, 1898—Praeger. Cahir, June 24, 1900—Praeger. Cultivated land N.W. of Cahir, June 26, 1900—Praeger.
8. LIMERICK. Foynes, July, 1903—Miss C. G. O'Brien.
9. CLARE. Parteenalax, September 26, 1903—R. D. O'Brien.

10. TIPPERARY N. Cultivated ground near Nenagh, June 24, 1899—Praeger. Cultivated land, Cloughjordan, August 12, 1900—Praeger.
12. WEXFORD. Cultivated ground, Enniscorthy, August 14, 1898—Praeger.
14. QUEEN'S COUNTY. Cultivated ground, Cullenagh, August 1, 1897—Praeger. Cultivated field, Maryborough, August 2, 1896—Praeger (a fine-flowered specimen).
17. GALWAY N.E. Cultivated ground, Dunmore, July 2, 1900—Praeger.
19. KILDARE. Cultivated field, Kilcock, August 9, 1896—Praeger. Cultivated ground, Kilkee Castle, June 18, 1899—Praeger.
21. DUBLIN. Baldoye, September, 1867—Rev. H. G. Carroll. Sand-pit, Rathfarnham, August 9, 1894—Praeger. Sandymount—*Ex Herb.* Trinity College.
22. MEATH. Field, Bective, June 27, 1896—Praeger.
23. WESTMEATH. Knock Drin, July 3, 1890—H. C. Levinge (*Herb.* H. C. Levinge). Drinmore, September 26, 1888—H. C. Levinge (*Herb.* H. C. Levinge).
25. ROSCOMMON. Gravel-pit near Athlone, June 18, 1898—Praeger.
30. CAVAN. Cultivated land, Mount Nugent, July 19, 1899—Praeger.
31. LOUTH. Cultivated ground, Ardee Bog, July 26, 1898—Praeger. Waste ground, Dunleer, July 15, 1900—Praeger.
38. DOWN. Sandy waste, Ballylessou, October 15, 1877—S. A. Stewart. Fields near new road, Ballynahinch—*Ex Herb.* Trinity College, Dublin.

F. parviflora, Lam.

4. CORK M. Wild in the old Botanic Gardens, 1849—Dr. Power (*Herb.* T. Chandlee).

F. purpurea, Pugsley.

20. WICKLOW. Field, Bray Head, July, 1872—*Herb.* Dr. Steele.
31. LOUTH. Waste ground, Dunleer, July 18, 1900—Praeger (large flowered form).
36. TYRONE. Strabane, July, 1896—M. C. Knowles.
39. ANTRIM. Glenmore, August, 1859—J. H. Davies (*Herb.* A. G. More).

Herbarium, National Museum, Dublin.

A SHORT NOTE ON THE FORAMINIFERA OF THE LARNE DISTRICT.

BY GEORGE C. GOUGH, A.R.C.SC., F.G.S.

As most of the readers of this Journal know, the Ulster Fisheries and Biology Association is undertaking the determination of the Flora and Fauna of Larne Lough and the adjacent sea. Mr. Wright, F.G.S., the well-known authority on the Foraminifera, being unfortunately too busy to examine the material dredged, it has fallen to my lot to determine the species present. I am happy to say that Mr. Wright is giving me invaluable assistance in many ways. My first report having been presented to the Council of the Association, it may not be out of place to give a short abstract, especially as it records a foraminifer new to Britain.

Although it is yet too early to give a definite account of the Order as found at Larne, yet the fact that 59 species have been found in three samples already examined, shows that it is well represented. As one might expect, most of the species are common around our coasts, and call for no special mention, but amongst the less common ones *Ophthalmidium carinatum*, Balk. and Wright; *Gaudryina rudis*, Wright; *Hyperammina arborescens* (Norman); and *Lagena aspera*, Reuss, may be cited. The first three are rare or absent elsewhere but on the Irish coast.

The rarest specimen found however is one of *Bulima elongata*, d'Orb., which is new to British seas, but which has been recorded by Brady from two other localities, viz., North Atlantic (630 fths.) and South Atlantic (1425 fths.). *Bulima elongata* is very like *B. pupoides*, but differs from it in that the later chambers are much smaller than in *B. pupoides* and are all about the same size, giving a more even appearance to *B. elongata*.

Taken as a whole the Foraminifera in the Lough itself are not good specimens of their kinds, far better examples being found in the adjacent open sea. It may also be noted that the lough itself has yielded so far very few arenaceous forms these being much more plentiful in the open sea.

One sample of a dredging taken in Red Bay last summer by the Association has been examined by Mr. Wright and has yielded him 36 species. This sample is notable among other things for the relative abundance of *Botellina labyrinthica*, Brady, an arenaceous foraminifer hitherto only met with at two or three localities, but which has been fairly abundant in each case. Mr. Wright's list brings the number of species recorded from the Larne district up to 69.

Queen's College, Belfast.

REVIEW.

A BIRD-BOOK FOR SPORTSMEN.

Snipe and Woodcock. By L. H. DE VISME SHAW. With Chapters on Snipe and Woodcock in Ireland by RICHARD J. USSHER: Cookery by ALEXANDER INNES SHAND: (Fur, Feather, and Fin Series.) Pp. vi.+298. 8 Illustrations. London: Longmans, Green & Co., 1903.

The object of the Fur, Feather, and Fin series is to present to naturalists and to sportsmen small monographs on the various English beasts, birds and fishes which are generally included under the head of game.

The greater part of this volume on Snipe and Woodcock is written by Mr. L. H. De Visme Shaw, and is divided into four sections; the first two sections are devoted to the natural history and shooting of the Snipe, the remaining two to the natural history and shooting of the Woodcock. In the natural history sections, Mr. Shaw describes the peculiarities and habits of these birds, discussing fully the various theories to account for the peculiar noise made by the Snipe when shooting downwards to the earth, and known as drumming; also the migration of the Woodcock, the method of carrying its young, and the nature of its long sensitive bill.

In the section on shooting, sportsmen will find much useful information.

Ireland being *par excellence* the land of Woodcock and Snipe, it is not surprising to find a chapter entitled Snipe and Woodcock in Ireland; it is written by Mr. R. J. Ussher, and to readers of the *Irish Naturalist* will probably form the most attractive portion of the volume. There is also a short chapter, by Mr. A. I. Shand, on the cooking of the birds. The excellent illustrations add to the attractiveness of the volume, which is well printed and neatly bound.

A. R. N.

THE DUNLIN IN THE BREEDING SEASON.

BY D. C. CAMPBELL.

DURING the late autumn months, through the shortening and lengthening days of winter, on to early spring, by every low-lying tidal river-shore and mud-flat the familiar flocks of so-called grey "Sandlarks" are to be seen. The Dunlins (*Tringa alpina*, Linn.) are pre-eminently the Sandlarks of our northern shores.

As we watch them feeding for a time, and then taking wing to shift their ground, it may be our eye loses sight of the flock as it swiftly passes over the grey shore, until suddenly it turns and then appears as it were innumerable points of silvery light as the *white breasts* turn to the sun and reflect the beams.

Seldom do these little birds fall before the sportsman's gun, but so closely do they sometimes pack, that I knew of one occasion on which they tempted a shore shooter to try his luck and 70 fell at one discharge.¹

But although so familiar in autumn and winter, the Dunlin is not so well known in its breeding dress. Many would hardly recognize it when seen in the more retired spots where it makes its home and rears its young.

It may be the following short notes will be of interest to some observers who have not had an opportunity of visiting these nesting haunts.

It is only during the last ten or may be fifteen years that the fact has become known that the Dunlin breeds in *many* localities in the N.W. of Ireland. I have noted it breeding in small numbers at Eglinton, Co. Derry, on the shore of Lough Foyle, and in large numbers at Inch, Lough Swilly, and have seen it in breeding plumage at Portrush in May and at Rosapenna, Co. Donegal, in July.

¹ Thompson (Nat. Hist. Ireland, vol. ii., p. 292) mentions from 70 to 100 Dunlins having been obtained by one discharge of a shoulder-gun on Belfast Lough, and upwards of 300 from one shot of a punt-gun in the same locality.—EDS.

At Inch it nests all over the bare sloblands by the inside waters, and there its breeding habits can be fully studied.

The nest is made in much the same position as that of the Lapwing and Redshank, but many that I examined on the sloblands were situated nearer the water and on damper ground than is usual with those of the larger birds.

It is made in a small depression (scraped, I think) in the midst, or by the side of a tiny tussock of grass. Often the grass is bent over the nest so that the eggs are not open to view like the Lapwing's.

The nest, which is deeper and more cup-like than the Lapwing's, is lined with fine dry grass. The eggs are very beautiful. There are two distinct types—the common type with olive ground-colour and *large* blotches of deep rich brown, and the rarer type, with light stone ground-colour and *small* blotches or spots of brown.

During the nesting season the breeding birds are very tame. The pair are usually to be found at the water's edge near the vicinity of the nest, and will allow one to approach to within a few yards. But I never found them very near the nest before incubation commenced, or flying round and showing intense anxiety like the Lapwing and Redshank. Mr. John M'Connell informs me that when the eggs are being hatched he has seen the Dunlin, when flushed from the nest, feign being wounded, to draw one away.

When the young are hatched the conduct of the parents is entirely different. Then they become even bolder and more heedless of danger than the Redshanks.

They will fly over and around one ceaselessly, but only occasionally do they utter their alarm note. On an afternoon last June, when I was walking along a ridge on the Inch slobland, where evidently a brood of young Dunlins were in hiding, the parents showed the greatest anxiety. One alighted some way off and walked towards us until within about six yards. Then both birds flew to and fro a few yards overhead, and just while passing, one (presumably the male) gave the peculiar breeding call or alarm note. This note is most distinctive, and once recognized can never be mistaken. It is a clear rippling whistle, and resembles the call note of the Whimbrel. The note is more slurred than that

of the Whimbril, and of course not nearly so loud. It can usually be heard at Inch all through the nesting season. I have been struck by the fact, that it is very hard to localize the exact spot from which the call comes; one can only judge the *direction*. Another alarm note is a full clear *single* note, which I think is emitted by both sexes.

I have frequently observed *flocks* of Dunlins at Inch in May, varying in numbers from 12 to 30. They always appeared to be in full breeding plumage, but unlike the nesting pairs were very wild and would never admit of a near approach. In May, 1902, I observed five birds in breeding dress on the Portinch Strand; they were fairly tame.

I often wondered how it was that these birds at Inch were not nesting, as suitable ground seemed to be practically unlimited. Mr. Moffat's most able and interesting article on the Rivalry of Birds¹ gave me the explanation. But a further question arises. Why do these non-breeding birds remain at Inch and not migrate further north and seek new localities? Is it possible that even in the northern parts the breeding haunts are also parcelled out and duly claimed?

Londonderry.

NOTES.

BOTANY.

Vegetation on brickwork.

When in Cork in August last, I observed near one branch of the river the brick cone of an old bottle works. The cone was well covered with a thick growth of very conspicuous vegetation, the plants seeming to be from one foot to two feet in height. A similar cone stands near to Queen's bridge in Belfast, but there is not a trace of vegetation to be seen upon it looked at from the street. I presume that a difference of the material used in the construction of the walls, or a difference in the humidity of the air in the two places might account for this. I should say the Belfast cone is used for grain stores, and also contains grinding machinery.

W. H. PATTERSON.

¹ *Irish Nat.*, vol. xii., 1903, p. 152.

Dublin Plants.

Chiefly in the course of days spent in botanical surveying with Dr. Pethybridge among the Dublin mountains last autumn, the following plants were observed, which may be worth recording:—

Barbarea arcuata, Reich.—Churchtown, Dundrum, a few plants on a shady roadside bank.

Saxifraga stellaris, L.—By a spring on Seecawn. Upper Glenasmole is the only previous Dublin station.

Filago minima, Fr.—Sparingly at Glencullen quarries. Previously recorded from the base of Three Rock Mountain only.

Arctium Newbouldii, Ar. Benn.—Edmundstown. For notes on this plant see *I.N.*, 1903, pp. 289-290, and 1904, pp. 3, 9, 15.

Hieracium boreale, Fr.—Wall on the north bank of the Dodder, opposite Rathfarnham. The banks of the same stream above Old Bawn form the only other Dublin station.

Vaccinium Vitis-Idæa, L.—On the slight hill between Kippure and Seefingan, and tolerably abundant on Seefingan. Kippure and Seecawn are the only recorded stations.

Andromeda Polifolia, L.—A frequent ingredient of the wetter bogs on the mountains, and almost always present where *Scirpus cæspitosus* becomes abundant. Noticed all along the ridge on which the county boundary runs from Kippure to the Military road; on the east side of the Military road near where it crosses the county boundary; on Glendoo Mountain; on the ridge west of Prince William's Seat; and in a wet bog N.E. of the same hill (presumably the station noted by Mr. Colgan, *I.N.*, 1903, p. 189).

Mentha rubra, Huds.—Established in wild ground on the north bank of the Dodder a quarter of a mile above Rathfarnham bridge. Apparently not on record for the county.

Lastrea Oreopteris, Presl.—Sparingly by the Killakee stream at 1,250 feet. Grows luxuriantly, and in some abundance by the Cot Brook in Glenasmole, and sparingly by the stream north of Seecawn.

Equisetum hyemale, L.—Abundant along a roadside fence east of Mount Venus (Mrs. R. Ll. Praeger).

R. LL. PRAEGER.

Dublin.

Iris fætidissima in West Mayo.

It may perhaps interest readers of the *Irish Naturalist* to hear that *Iris fætidissima*, as recorded by Mr. Praeger last year (vol. xii., p. 269), has been well established for some years in West Mayo. I noticed a good many plants growing by the roadside at Murrisk, close to the foot of Croaghpatrick, on the drive from Louisburgh to Westport, on the 28th June, 1900, and was specially interested in the discovery, as it was new to District VIII. of the *Cybele Hibernica*.

FRANCES M. MORE.

Rathmines.

Juncus tenuis in County Down.

The occurrence of this plant in County Down has already been briefly announced in the *Irish Naturalist*. It happened that in August, 1899, I found three or four tufts of a slender, wiry rush, which, not at that time knowing *Juncus tenuis*, I thought possibly might be a curious seaside variety of *J. squarrosus*. It lay with other unexamined things until the autumn of 1902, when, on re-examination, its true position dawned on me. In view of the fact that this rush had only recently been detected in Ireland by Mr. R. W. Scully, and was not yet known in the north, it became of importance to know to what extent it prevails in this new station, and in early July, 1903, I made this attempt, but was not successful. This lack of success was not due to any scarcity of the plant, but, perhaps, because the flower stems were not up, and the leaves were hidden amongst other rushes, grasses, and various plants. Another search at the latter end of August showed *Juncus tenuis* in abundance, occupying a belt over 100 yards in length, by from one yard to three yards in breadth. In this belt it is the principal feature, growing in dense tufts with stems from 10 to 20 inches in height. The locality is the enclosure of reclaimed and at Belfast harbour which has been named Victoria Park. This rush does not grow on the reclaimed slobland, but at the upper end on what is the old sandy stony margin of the lough. It is confined to the belt already mentioned, save about a dozen of isolated tufts occurring at a distance of some 50 yards. Subsequently, I have examined the shore in a seaward direction for two miles without finding any further extension of this rush. The County Antrim shore was also searched for a similar distance, but without success. The question arises, how has this plant remained so long undetected in this accessible and well known spot? It must, I think, be due to the fact that until the flower stems appear one may pass close by without suspecting its presence. Besides this, the collector is attracted to the drains and marshes which show such tempting masses of vegetation and gayer blooms.

S. A. STEWART.

Belfast.

ZOOLOGY.

A Rare Copepod.

A female specimen of *Monstrilla longiremis* was obtained in the surface tow-net in Larne Lough, on December 8th. Its length—not including the antennæ—was $4\frac{1}{2}$ mm. On January 14th and 18th five male specimens were obtained, four in the bottom tow-net, and one in the surface tow-net. This Copepod, so far as I can ascertain, is new to Ireland, although it has been recorded on one or two occasions on the English side of the Irish Sea.

JOSEPH PEARSON.

Marine Laboratory,
Larne Harbour.

Large Lepidoptera at Wexford.

A perfect specimen of *Sphinx convolvuli* was given me on the 29th September by two boys, who found it resting on a post on the railway embankment, near Wexford terminus. It was freshly emerged.

In September I was given, by the Chief Warder, Wexford Prison, a caterpillar of the Death's-Head Hawkmoth, *Acherontia atropos*, which he found in the garden feeding on the potato plant. It is now pupating.

Close to the River Slaney, and about a mile from Wexford, I found, feeding on sallow (5th October), some hundreds of caterpillars of the Oak-Egger moth, *Lasiocampa quercus*. I took some of them, and they continued to feed for about a week, but are now hiding under moss.

J. H. JOHNSTON.

Wexford.

Marine Mollusca of Achill.

The following species are additional to the list of Achill mollusca given by Mrs. Tatlow and Mr. Praeger in *I. N.*, June, 1898. Dr. Chaster has kindly identified the critical species. The two marked with an asterisk are new to Province V. (From Loop Head to Erris Head).

<i>Velutella phaseolina</i> .*	<i>Scala clathratula</i> .
<i>Modiolaria costulata</i> .*	<i>Aclis minor</i> .
<i>Thyasira flexuosa</i> .	<i>Odostomia plicata</i> .
<i>Tellinmya ferruginosa</i> .	<i>Brachystomia albella</i> .
<i>Spisula subtruncata</i> .	<i>Pyrgulina indistincta</i> .
<i>Cardium fasciatum</i> .	<i>Spiralinella spiralis</i> .
<i>nodosum</i> .	<i>Leiostraca bilineata</i> .
<i>Dentalium vulgare</i> [=tarentinum].	<i>Mangilia striolata</i> .
	<i>Diaphana hyalina</i> .

All were obtained last September from the bay near Lough Nambrack. On the sandy shore of Sruhilla Lough (tidal), on the east coast of the island, the predominant species were *Cardium edule* and *Skenia planorbis*.

A. L. MASSY.

Malahide.

Porbeagle Shark in Killala Bay.

On the 20th November, when walking along the Enniscrone sands, I found two specimens of the Porbeagle Shark (*Lamna cornubica*) thrown up by the surf, they had been evidently ashore for some days. The largest measured 7 feet from point of snout to end of longest lobe of tail, the other specimen about 6 inches shorter. Each had a double row of teeth on sides of upper and lower jaw, and three rows in front of each. They were apparently females, for I saw no claspers on either specimen.

ROBERT WARREN.

Moyview, Ballina.

Food of Gillaroo Trout.

Mr. W. B. Fennell in dissecting a $\frac{3}{4}$ lb. Gillaroo Trout at Lough Melvin found in the stomach a mass of freshwater shells, including 80 specimens of *Valvata piscinalis*, over a dozen *Bythinia tentaculata*, several *Limnæa peregra*, with one each of *L. stagnalis*, *P. carinatus* and *P. contortus*.

Belfast.

R. WELCH.

A Winter Corncrake in Co. Galway.

While snipe shooting near Kilure bog, Clonbrock, in company with Mr. Dillon, on Wednesday, 25th November, the keeper (Mason) pointed me out a corncrake (*Crex pratensis*) running in the grass.

LEOPOLD H. CONGREVE.

Waxwings in Ulster.

There appears to have been a flight of Waxwings (*Ampelis garrulus*) to the north of Ireland last year (1903). I have notes of over twenty having been seen or shot. The first was shot in the townland of Bleary, Co. Armagh, on 22nd October. It was reported to Mr. W. H. Workman at the B.N.F.C. Conversatione on October 28. I understand it was sent to Dublin to be mounted. The second was obtained near Loughgall, Co. Armagh, on 1st November, and examined by me. On 6th November two beautiful males were shot at Toomebridge, Co. Antrim. For three weeks none were reported, and then, on 29th November, two were sent up from the town of Antrim, with the information that they were "plentiful" in Lord Massereene's demesne, and that the sender could have shot as many as he liked. Fortunately he was content with two. On 2nd December three were seen at Larne, Co. Antrim, and one of them shot, as Mr. Coey kindly informed me. I saw the latter, which was a female. Then on 5th December two were seen (one shot) at Lissue, Co. Antrim. Mr. N. H. Foster sent me this one, an immature female. On the same date another female was shot at Aghalee, Co. Antrim. A female was picked up dead at Whitehead, Co. Antrim, on 8th December. (This is the same specimen that Mr. Tomlinson records on p. 46). Two more were shot at Islandmagee, Co. Antrim, on 10th December, while five others were seen about the same date near Larne. One of these was captured alive by Mr. Coey and kept in a cage for some days, but it died on 21st December and Mr. Coey kindly sent it to me. The last I have a note of is one that Mr. Foster informs me was seen in Hillsborough Demesne, Co. Down, on 6th January, 1904. But I was informed on reliable authority that a flock of over thirty was seen about the middle of December near Glenarm, Co. Antrim. October seems to be a remarkably early date for this northern bird to visit us. Indeed I can find no other Irish record for this month, and only one or two previous occurrences in November. The above notes record one in October and five in November, and probably other observers in Ireland will be able to add to these this year, if the flight has been of any magnitude.

Holywood, Co. Down.

ROBERT PATTERSON.

The Waxwing in Co. Antrim.

An adult female of this rare visitor was found near the Whitehead Station of Belfast and Northern Counties Railway on the morning of the 8th December, having been killed during the preceding night by flying against the telegraph wires on the railway line. Mr. Berkeley D. Wise, C.E., the chief engineer of the Company, had it sent to Wm Sheals, Belfast, for mounting. The latter reported that he had received five others for a similar purpose during the previous month, a record worthy of note.

W. J. C. TOMLINSON.

Belfast.

Siskin Breeding in the Co. Wicklow.

A young friend, formerly a parishioner of mine, found a pair of Siskins breeding this year near Rathdrum, in the Co. Wicklow. He has written to me several particulars about the birds, which perhaps may prove of interest to others. Two nests were found—the first on May 4. This nest was taken on the 19th, and it contained two eggs, one of which unfortunately was broken in the fall of the branch upon which the nest was built. He carefully measured the height of the nest, and wrote saying it was fifty-three feet from the ground, and about fifteen feet from the stem of the tree. He saw the bird taking moss from a Goldfinch's as well as a Chaffinch's nest. The second nest, like the first, was also found in a Scotch Fir, in the topmost branches, seventy-two feet from the ground. It was placed in a fork, and well hidden. The old birds were very fearless. Indeed, the hen bird was so tame that she went on the nest first found several times when he stopped shaking the bough.

The second nest was less than 200 yards distant from the first one. It also contained two eggs. He found it by watching the old bird stealing moss from a Chaffinch's nest. He is almost certain that it belonged to the same pair of birds, as he discovered it only a few days' later. When he found it, on the 24th May, this nest contained two eggs, and the same number on the 27th.

I have frequently seen Siskins about Portlaw—several times in small flocks in the surrounding woods during winter, and again in smaller numbers in spring. I have little doubt but that they breed in this neighbourhood, though I have never found the nest. I had never heard of the Siskin's thieving propensities, until my young informant wrote me word. I may mention that he is a most accurate and careful observer, and while he lived in my parish gave me a good deal of help in natural history. Three years ago he brought me numerous caterpillars and pupæ of *Cenistis quadra*, and showed me a great many larvæ feeding on lichens on Oak, Beech, and Whitethorn. A most interesting and detailed account of the Siskin, its life history, breeding habits, and distribution, is given by Mr. Ussher in his "Birds of Ireland."

WILLIAM W. FLEMING.

Coolfin, Portlaw.

Grasshopper Warbler at Lough Swilly.

On the 16th June, at about half-past nine in the evening, I heard the Grasshopper Warbler close to my house, in an Alder scrub by a ditch, close to a water-lily pond. From that date till the 10th of July I heard it each night that I went to listen, which was nearly every night. It generally began about half-past eight, and from that time never ceased till dawn, as long as I was present. I saw the birds a couple of times, once about the end of August, but was careful not to disturb them, as I have no doubt they were nesting. The note resembled the call-note of a wren to its young, but was quicker in trill and quite continuous, and higher-pitched as well as softer. It seemed to swing a little from high to low in cadence, and would often appear to be only a few feet from me; at other times, twice or three times as many yards within a second or two. I have only heard them once before, twenty years ago in Co. Wexford. I understand the Rev. A. Delap has heard them at the south end of the county on the Tyrone borders.

I brought several natives to listen to the notes at different nights, to all of whom it was new. One woman compared it to the reeling up of the "rowings" on the spinning wheel. It was a good year here for Warblers; both Willow Wren and Chiffchaff stayed some time, which is not always the case.

H. C. HART.

Carrablagh, Co. Donegal.

Cuckoo's Note uttered while Flying.

Some years ago (during 1894) a number of notes by different writers appeared in the *Zoologist* with reference to the Cuckoo calling while on the wing. At the time it seemed to me to be a rather unusual occurrence, though several observers stated that they had noticed it not uncommonly. This year I had a good opportunity of watching a Cuckoo at Tramore in this county, and listened to it uttering its call while flying. On one day (June 4) I heard it repeat "cuckoo" no less than eight times during one continued flight, and shortly afterwards the bird called five times, also during one flight.

Professor Newton spells the bird's name "Cuckow," in the 4th edition of Yarrell's "British Birds"; and, in an account of the bird to be found in the last edition of the "Encyclopædia Britannica," vol. vi., p. 685, he states that thus "the word was formerly, and more correctly, spelt, changed without any apparent warrant except that accorded by custom, while some of the more scholarly English ornithologists, as Montague and Jenyns, have kept the older form." It seems to me that there was good reason for altering the spelling to "Cuckoo." The bird's name admittedly was given to it on account of the note it utters, as is also the case with regard to other birds—*e.g.*, Chiffchaff, Curlew, Hoopoe. I think that most observers will say that "cuckoo" is nearer to the bird's note than "cuckow."

WILLIAM W. FLEMYNG.

Portlaw.

Involuntary Capture of a Swallow.

Many years ago, walking by the river Manifold, a tributary of the Dore, I saw a Swallow caught on a fishing line, which was itself caught on a tree. The bird flew backwards and forwards as far as the length of the line permitted, and then hung exhausted temporarily, while from time to time another Swallow descended and attacked the line vigorously with its beak. The prisoner was quite uninjured when released, the hook had passed through the soft part of the lower mandible. It was a pretty sight to see the meeting of the two birds high in the air.

LAURA R. THORNELY.

Liverpool.

In response to a query in the November number of the *I. N.* under the above heading, the following may be of interest :—In the summer of 1882 I was trout-fishing in Glenariff River, Co. Antrim, and whilst sheltering from a thunder-shower under a bank, struck the spike of the rod in the ground, leaving the fly-cast floating in the wind. When the shower had nearly ceased I noticed the rod bending about in all directions, and then found that a Swallow had taken the tail fly! I at once released the bird as gently as possible, when it flew away apparently not much the worse of being hooked. It showed how well the flies were copied from nature.

ALEX. MCHENRY.

Sandymount, Dublin.

A late House-Martin.

On November 10th I saw at Wexford, just outside the town, a House-Martin flying along and hawking as it went, but though the day was very fine I should be doubtful as to its getting a very full meal. It was flying in the direction of the sea and probably hastening to join its comrades who had preceded it towards the sunny south. I do not think I ever saw a swallow of any kind at so late a date.

W. F. JOHNSON.

Poyntzpass, Co. Armagh.

A Black Rat on board Ship.

When on board the Department of Agriculture's steamer "Helga" in the beginning of December, 1903, a black rat, which had been killed on board, was brought to me by one of the crew. Being doubtful whether it was the true Black Rat (*Mus rattus*) or the black variety of the common Brown Rat (*Mus decumanus*). I forwarded the skin to Dr. Scharff, who kindly informed me that it was a specimen of the former (*M. rattus*). The place of origin of the animal is of course doubtful, but it is popularly reported to have come on board at Derry.

G. P. FARRAN.

Department of Agriculture (Fisheries Branch).

Seal caught on a Handline.

On the night of November 11, a young Seal was caught near Valentia Harbour by one of the local fishermen on a handline with rubber bait. It was about three feet long, light grey underneath, speckled with darker grey on the back.

MAUD J. DELAP.

A Bat on the Wing in December.

On the evening of December 7th, I saw a bat flitting about in Poyntzpass. The hour was 5 p.m., and the evening was not particularly warm. The bat was very busy flitting up and down and across some trees, but what it would be getting I do not know; possibly gnats or some of the winter moths, *e.g.*, *Cheimatobia*. I should like to know whether it is usual to see bats about so late in the year?

W. F. JOHNSON.

Poyntzpass, Co. Armagh.

[Though not "usual," it is well-known that bats occasionally come out in the middle of winter. The *Irish Naturalist* contains records of such occurrences on 1st, 18th, and 25th December and 2nd January in various years.—EDS.]

GEOLOGY.

Greensand Section at Whitehead.

The B. & N.C. Railway Co. are now filling in the hollow between the railway embankment and the Coastguard station gate. The material used is debris from the old quarry tip, the removal of which has exposed, on the south side of the old limekiln, a fine section of Greene sand, about thirty feet long by eighteen feet or so in height. The base of the section is, however, still covered. In addition to this, a long prolongation of the section, about two to three feet high, is exposed, under a thin covering of debris, for well over one hundred feet. Geologists should take advantage of this exposure, as the rock is very fossiliferous, and as it is quite soft in most places, the Rhynchonellas, Urchins, and Urchin spines are easily taken out. I got eight specimens of the former (three species) in almost as many minutes with a pocket knife. The section is being rapidly quarried away for the filling, but large blocks are available where they have rolled to the base of the new siding. The Glauconitic Sands were well exposed during the making of the tunnel here many years ago, and Ralph Tate described them with their contents. It is a pity the section was not available while Dr. Hume was making his survey, in 1897, of the Antrim Cretaceous rocks. He gives it only half a page.

R. WELCH.

Belfast.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include three Terrapins from Dr. Graham Kenshaw, a Pigtailed Monkey from Sir Algernon Coote, a Ringed Snake from Mr. W. Burke, a Rabbit from Miss D. Trotter, two Sulphur-crested Cockatoos from Mr. J. P. Jaffares, a Raven from Mrs. Curling, a Long-eared Owl from Mr. J. A. Merne, fifteen Mice from Mrs. Hyde-Lex, an Australian Piping-Crow from Miss Blunt, and a Hare from Messrs. Carton.

DUBLIN MICROSCOPICAL CLUB.

DECEMBER 9.—The Club met at Leinster House. R. F. SCHARFF exhibited an improved pattern of a dissecting microscope made by Hachet of Paris. The advantages of it are that the object is not reversed as in an ordinary instrument and that the field of vision is very large. He demonstrated the principles of the instrument, and showed several species of Irish freshwater leeches whose specific characters were conspicuously visible under the lens.

F. W. MOORE showed flowers of *Mormodes luxata eburnea*, a Mexican Orchid, with very interesting mechanical arrangements by which the pollen masses are rapidly thrown forward when the column is slightly touched.

G. H. CARPENTER showed a larva of the ground beetle *Loricera pilicornis* from Co. Galway. This larva is remarkable for its powerful mandibles and the excessive length of its feelers, maxillæ, legs, and cercopods.

J. A. CLARKE showed sections through the growing-point of a Beaplant, demonstrating karyokinetic figures in the divisions of the nuclei.

BELFAST NATURALISTS' FIELD CLUB.

DECEMBER 15.—Wm. GRAY, M.R.I.A., in the chair. Mr. David C. CAMPBELL, of Londonderry, lectured on "Birds: their Structure, Flight, and Habits." Mr. Campbell first touched upon birds in general, and showed what an important place they occupy in the economy of nature. Although in point of numbers far short of the insects, birds comprised, after them, the largest class of animals. So far as scientists had discovered, there were between 12,000 and 13,000 different species of birds found upon the globe. People in the British Islands were particularly well situated for studying bird life, largely owing to their insular position as the outpost of Europe, and also to their comparatively mild winters. Out of a total of 700 European birds the British Isles could claim 371 species, and Ireland 290 species. Some of these had only visited our land, it might be, a few times, while others were common and widely distributed. Of the 371 British species 370 inhabited other parts of the world, the one species limited to the British Isles being the common Red Grouse. In examining a bird's structure one of the most striking

points was the very deeply-keeled sternum, or breastbone, possessed by the great majority of species. This deep keel was to carry the enormously-developed breast muscles, which enabled a bird to fly and to remain on the wing, it might be, for fifteen hours at a stretch, and to cover many hundreds of miles in one sustained flight. Another very interesting point in the bird's structure was the ingenious arrangement of the tendons of the leg, by which the bird was able to retain its hold upon a branch while asleep, and the more profoundly the bird slumbered the more secure was its hold. The lecturer also referred to the feathers of birds, which varied much, some being for warmth, some for flight, and some for ornament, and touched upon the great and absorbing interest of the bird to obtain food. Most of the small birds were good friends to the farmer and gardener, as they destroyed myriads of insects, while the gulls acted as splendid scavengers, clearing off the decaying garbage that would bring disease and plague to many a fishing village and seaside town. The lecture, which was illustrated by a large number of lantern slides, shown by Mr. A. R. Hogg, was listened to with great attention, and at its close R. Welch and N. H. Foster referred to it in praiseworthy terms. The names of two new members for the Society were put forward, and the proceedings terminated.

BOTANICAL SECTION. NOVEMBER 21.—The first meeting of the Winter Session was held on the afternoon of Saturday, the 21st November, when Rev. C. H. WADDELL, B.D., delivered the first of a series of lectures on the *Umbelliferae*. **DECEMBER 19.**—W. H. PHILLIPS delivered an address on *Polystichum angulare* var. *proliferum*, past and present.

DUBLIN NATURALISTS' FIELD CLUB.

JANUARY 12.—ANNUAL GENERAL MEETING—C. B. MOFFAT, B.A., in the chair. Eighteen members and visitors were present. The minutes of the previous meeting having been read and signed, Dr. G. H. PETHYBRIDGE (Hon. Sec.), brought forward the changes in the rules of which notice had been given. The Hon. Treasurer (H. K. Gore Cuthbert) seconded the motion, which was passed. The Hon. Sec. then read the annual report, and the Hon. Treasurer presented the balance sheet for 1903. Both were passed.

The names of the Officers and Committee for 1904 nominated at the December meeting were read, when Mr. Praeger rose on a point of order and questioned the validity of the election, in as much as a section of Rule 8 had not been observed, the names of the proposed Officers and Committee not having been communicated to the members. The Hon. Sec. questioned the interpretation which Mr. Praeger had put upon the rule. After a discussion in which the Hon. Treasurer and Mr. Roycroft and Mr. Ellison took part, the Chairman ruled that the announcement of officers might proceed, but that the decision on the point must rest with the Committee, which would use the powers vested in it under Rule 17.

Votes of thanks were passed to the outgoing Officers and Committee, and to the Council of the Royal Irish Academy for granting the use of the Academy House for the evening meetings of the Club. The following were proposed as members:—Howard Fleming, and Miss M'Ardle (associate member).

IRISH FIELD CLUB UNION.

REPORT, 1903.

During the year 1903 an exchange of lecturers has been carried out as usual, Belfast sending a lecturer to Dublin, Cork, and Limerick, and Dublin sending a lecturer to Belfast. The statement regarding aims, constitution, and work of the Union was transmitted to all the Clubs at the beginning of the year, and published in the *Irish Naturalist* for March. The Committee met in Dublin on November 3, and arranged a provisional programme for the Field Club Conference and seven-day excursion to be held at Sligo in July next.

ACCOUNTS, 1903.

RECEIPTS.			EXPENSES.		
	£	s. d.		£	s. d.
To Balance, 1902,	5	4 4	Typewriting Report,	0	1 0
Affiliation Fees—			R. Ll. Praeger, Lecture in Belfast,	1	10 5
D.N.F.C., 1902,	1	3 4	Eason & Son, and Thom & Co., printing 150 copies of Statement	2	19 7
C.N.F.C., 1902,	0	7 4	N. H. Foster, attending Committee,	0	9 5
B.N.F.C., 1902-3,	2	2 0	W. H. Phillips, do.	0	9 5
I.F.C., 1903, .	1	0 8	G. C. Gough, Lectures in Dublin, Cork, and Limerick,	3	8 3
				8	18 1
			By Balance,	0	19 7
	£9	17 8		£9	17 8

Audited and found correct.

J. DE W. HINCH,

15th January, 1904.

Hon Sec. D.N.F.C.

R. LLOYD PRAEGER, *Hon. Sec.*

THE BIRDS OF A NEIGHBOURHOOD.

BY N. H. FOSTER, M.B.O.U.

DURING the past year I have noted month by month the various species of birds observed by me in this neighbourhood.

This district, an undulating tract of country rising above sea-level from one hundred feet at the river Lagan to almost six hundred feet, is mainly situated in Co. Down, and would be enclosed by a circle of about eight miles in diameter, having the village of Hillsborough as its centre; it is principally composed of well-cultivated land, but includes several lakes and ponds, and a number of small peat bogs, and though comprising no extensive woods, it contains many small plantations and a large number of trees.

The species observed amount to seventy-two, of which details are given in the two subjoined tables.

It may be well to state that these observations were casually made, *i.e.*, I did not go specially to different localities each month to look for a particular species, or doubtless the lists would have been considerably extended, as some of these birds mainly frequent limited areas in the district, while the great majority of my observations were made along the mile of road intervening between my residence and place of business.

TABLE I.—NUMBER OF SPECIES OBSERVED DURING EACH MONTH
IN 1903.

January,	.	.	.	.	32	species.
February,	.	.	.	.	38	"
March,	.	.	.	.	39	"
April,	.	.	.	.	42	"
May,	.	.	.	.	56	"
June,	.	.	.	.	51	"
July,	.	.	.	.	53	"
August,	.	.	.	.	53	"
September,	.	.	.	.	51	"
October,	.	.	.	.	45	"
November,	.	.	.	.	43	"
December,	.	.	.	.	49	"

TABLE II.—SHOWING NUMBER OF MONTHS DURING WHICH DIFFERENT SPECIES WERE OBSERVED.

Mistle Thrush (<i>Turdus viscivorus</i>),	12
Song Thrush (<i>Turdus musicus</i>),	12
Redwing (<i>Turdus iliacus</i>),	5
Fieldfare (<i>Turdus pilaris</i>),	5
Blackbird (<i>Turdus merula</i>),	12
Stonechat (<i>Pratincola rubicola</i>),	7
Pedbreast (<i>Erithacus rubecula</i>),	12
Whitethroat (<i>Sylvia cinerea</i>),	6
Goldcrest (<i>Regulus cristatus</i>),	12
Chiffchaff (<i>Phylloscopus rufus</i>),	8
Willow Warbler (<i>Phylloscopus trochilus</i>),	6
Sedge Warbler (<i>Acrocephalus phragmitis</i>),	3
Grasshopper Warbler (<i>Locustella naevia</i>),	3
Hedge Sparrow (<i>Accentor modularis</i>),	12
Dipper (<i>Cinclus aquaticus</i>),	2
Long-tailed Tit (<i>Acredula caudata</i>),	8
Great Tit (<i>Parus major</i>),	12
Coal Tit (<i>Parus ater</i>),	12
Blue Tit (<i>Parus cæruleus</i>),	12
Wren (<i>Troglodytes parvulus</i>),	12
Tree Creeper (<i>Certhia familiaris</i>),	10
Pied Wagtail (<i>Motacilla lugubris</i>),	9
Grey Wagtail (<i>Motacilla melanope</i>),	12
Meadow Pipit (<i>Anthus pratensis</i>),	11
Waxwing (<i>Ampelis garrulus</i>),	1
Spotted Flycatcher (<i>Muscicapa grisola</i>),	5
Swallow (<i>Hirundo rustica</i>),	7
House Martin (<i>Chelidon urbica</i>),	4
Sand Martin (<i>Cotile riparia</i>),	3
Greenfinch (<i>Ligurinus chloris</i>),	10
Siskin (<i>Carduelis spinus</i>),	6
House Sparrow (<i>Passer domesticus</i>),	12
Chaffinch (<i>Fringilla cælebs</i>),	12
Linnet (<i>Linota cannabina</i>),	10
Lesser Redpoll (<i>Linota rufescens</i>),	12
Bullfinch (<i>Pyrrhula europæa</i>),	12
Common Bunting (<i>Emberiza miliaria</i>),	4
Yellow Bunting (<i>Emberiza citrinella</i>),	12
Reed Bunting (<i>Emberiza schanichus</i>),	9
Starling (<i>Sturnus vulgaris</i>),	12
Magpie (<i>Pica rustica</i>),	12
Jackdaw (<i>Corvus monedula</i>),	12
Rook (<i>Corvus frugilegus</i>),	12
Skylark (<i>Alanda arvensis</i>),	12
Swift (<i>Cypselus apus</i>),	4

Kingfisher (<i>Alcedo ispida</i>),	.	.	.	.	6
Cuckoo (<i>Cuculus canorus</i>),	.	.	.	.	3
Barn Owl (<i>Strix flammea</i>),	.	.	.	.	1
Long-eared Owl (<i>Asio otis</i>),	.	.	.	.	1
Sparrow Hawk (<i>Accipiter nisus</i>),	.	.	.	.	7
Kestrel (<i>Falco tinnunculus</i>),	.	.	.	.	7
Heron (<i>Ardea cinerea</i>),	.	.	.	.	11
Mute Swan (<i>Cygnus olor</i>),	.	.	.	.	12
Mallard (<i>Anas boscas</i>),	.	.	.	.	6
Tufted Duck (<i>Fuligula cristata</i>),	.	.	.	.	2
Scaup (<i>Fuligula marila</i>),	.	.	.	.	1
Ring Dove (<i>Columba palumbus</i>),	.	.	.	.	12
Pheasant (<i>Phasianus colchicus</i>),	.	.	.	.	11
Landrail (<i>Crex pratensis</i>),	.	.	.	.	4
Water-rail (<i>Rallus aquaticus</i>),	.	.	.	.	1
Moorhen (<i>Gallinula chloropus</i>),	.	.	.	.	12
Coot (<i>Fulica atra</i>),	.	.	.	.	7
Lapwing (<i>Vanellus vulgaris</i>),	.	.	.	.	11
Woodcock (<i>Scolopax rusticula</i>),	.	.	.	.	1
Snipe (<i>Gallinago caelestis</i>),	.	.	.	.	10
Sandpiper (<i>Totanus hypoleucus</i>),	.	.	.	.	2
Redshank (<i>Totanus calidris</i>),	.	.	.	.	1
Curlew (<i>Numenius arquata</i>),	.	.	.	.	2
Black-headed Gull (<i>Larus ridibundus</i>),	.	.	.	.	8
Common Gull (<i>Larus canus</i>),	.	.	.	.	2
Herring Gull (<i>Larus argentatus</i>),	.	.	.	.	4
Little Grebe (<i>Podiceps fluvialtilis</i>),	.	.	.	.	9

Hillsborough, Co. Down.

NEWS GLEANINGS.

John Grattan.

Prof. Symington has issued in pamphlet form his recent presidential address to the Belfast Natural History and Philosophical Society on the craniological work of the late John Grattan, of Belfast. The address is a high appreciation of the exact methods and mechanical skill of this but little known investigator, and Grattan's ingenious form of craniometer is illustrated and described.

S. A. Stewart

Our heartiest congratulations to our veteran colleague, S. A. Stewart, of Belfast, on his election to the Associateship of the Linnæan Society.

FURTHER ADDITIONS TO THE FLORA OF COUNTY DUBLIN, WITH NOTES ON SOME DOUBTFUL RECORDS.

BY NATHANIEL COLGAN, M.R.I.A.

WHEN publishing some recent botanical records for the County Dublin in the pages of this Journal in July last, the belief was expressed that in spite of the advanced state of our knowledge of the county flora some further additions might be expected in the shape of aliens, or critical sub-species. The results of last year's field work have fully justified this expectation. No less than three native and four alien plants have been added to the flora, a proof, if any were needed (and no experienced field worker requires any), that there is no such thing as finality in the botanical exploration of even the smallest county. These additions to the flora are printed in small capitals in the following list, the aliens being distinguished by an asterisk, and at the same time a few records for the rarer county species have been thrown in, the whole being arranged in the usual botanical sequence. Except where otherwise stated, the writer is the authority for the records.

Nasturtium palustre, DC.—In damp muddy ground by the Broad-meadow Water, above Fieldstown, 1903.

Trifolium filiforme, L.—In moist peaty ground at the northern end of the Bog of the Ring, 1903, a wilder station than those in which this species is usually found in Ireland, where it often seems open to the suspicion of having been introduced with grass seed.

AGRIMONIA ODORATA, Miller.—Sparingly with *A. Eupatoria* amongst bushes on a grassy roadside at Castle Bagot, Milltown, midway between Clondalkin and Newcastle, 1903; apparently very rare in the county.

***SEDUM RUPESTRE**, Hudson.—Fully established and looking quite wild on old rock cuttings in the abandoned limestone quarry at Cloghran, near Cloghran church, Swords, 1903.

GALIAM ULIGINOSUM, L.—In fair quantity amongst *Sphagnum* in a marsh on the flank of Kilmashogue Mountain above Stackstown, at a height of 800 feet, 1903. In Wade's *Dublin*, 1794, this species is recorded as found growing in wet pastures and by hedges around Templeogue and Terenure. Wade's authority is, however, insufficient for a critical species such as this is. His records have never been confirmed, and there can be little doubt that his Terenure and

Templeogue plant was the var. *Witheringii* of the common *G. palustre*, so that the present record may fairly be taken as the first for the county. It gives the highest vertical range so far observed for the species in Ireland. In Great Britain it attains to an elevation of at least 1,600 feet.

Hieracium murorum, L., var. **maculosum**, Dahlstedt.—I am indebted to Mr. Praeger for the suggestion that the new Co. Dublin Hawkweed recorded in these pages in July last under the name *H. maculosum*, Dahlstedt, might be better named as above, in accordance with the London Catalogue. On re-consulting authorities, I find that although Dahlstedt originally described the plant as a species, he afterwards subordinated it as a variety to *H. murorum*. When comparing my specimens with the description in F. N. Williams's *Prodrum Flor. Brit.*, p. 136, I extracted by oversight the old synonym instead of the more recent varietal name, which is no doubt better fitted to mark the position of the plant as a member of the complex group, *H. murorum*. He would be a bold man, indeed, who should venture to dogmatise as to the limits of species and varieties in this protean genus, but in the present case it would appear to be the safest course to adopt the varietal name. In cultivation, the conspicuous blotching of the leaves persists, and the Rev. W. R. Linton, having more closely studied the plant, accepts my naming, as he finds the differences between it and Dahlstedt's *maculosum* insufficient to warrant their separation. It is probably an alien in Co. Dublin; how or whence introduced does not appear.

Senecio viscosus, L.—Some fresh Howth records for this rare species have been kindly supplied to me by Miss R. M. Mahaffy, who found it between the Bailey Lighthouse and Sutton in 1900, and on Sutton beach in the present year. Though now extremely rare, this species has held its ground in or around Howth for at least 110 years.

***Matricaria occidentalis**, Greene.—In the first record of the appearance in Ireland of the interesting alien, *Matricaria discoidea* DC. (*Ir. Nat.*, iii., 215), attention was drawn to the two very distinct forms in which it occurred in Co. Dublin—one, the common form, a low, procumbent, much-branched plant, with small flower heads and entire seed crown; the other, upright and more robust, with large heads and toothed seed-apex. This latter plant, described in Asa Gray's *Synoptical Flora of North America*, 1886, and, apparently with good reason, constituted a species by E. L. Greene, appears to be spreading in Ireland, though still rare. In 1902 I found a few vigorous plants growing in waste ground by the Grand Canal below Hazlebach, its third station for Co. Dublin. Dr. Scully has already recorded it for N. Kerry (*Ir. Nat.*, xii., 114). It would be of interest to have further details of its Irish distribution, as it is likely to occur sparingly wherever *M. discoidea* is found. In California,

according to W. L. Jepson (*Flor. West. Mid California*, 1901, p 515), its habitat is the "rich soil of fields," while the commoner *M. discoidea*, as with us, usually inhabits beaten tracks. A very distinct dwarf variety of *M. discoidea*, the var. *pygmæa* of Semler, which is found in sandy ground in Bavaria, has not so far been recorded for Ireland, though it may be expected to occur. Nürnberg specimens of this variety in my herbarium are uniformly one-flowered, with unbranched stems ranging from an inch to an inch and a half in height.

Lithospermum arvense, L.—A single plant near King James's Castle, Finglas, 1903 (Miss M. C. Knowles). Sparingly by the roadside near Carrickmines, 1903 (Arthur D. O'Murchoe). It is hard to decide whether this species be more than a casual in Co. Dublin. Though there are fairly numerous records for it reaching back for a century, in almost all cases it appears to occur in very small quantity.

***LINARIA PURPUREA**, Miller.—In profusion and thoroughly established for fully 100 yards along the bank of a deep railway cutting, near Island Bridge, 1903. It has undoubtedly originated here as a garden escape or outcast.

Chenopodium murale, L.—In two places near Corballis, Portrane, 1903 (Dr. Scully & N. C.). Though very rare in Dublin and apparently becoming rarer, the appearance of this species in various stations from time to time within the last 100 years entitles it to a place in the county flora.

***HIPPOPHAE RHAMNOIDES**, L.—Now fully naturalised on the Rush sand-hills, where it freely reproduces itself from seed. The following notes show its standing here in 1902:—A large thicket on sandy bluffs above the beach at Rogerstown coast-guard station, with small scattered plants, apparently self sown, in the vicinity; some hundreds of seedling plants spreading for forty-five paces along a sandy fallow near Rogerstown harbour, the seedlings obviously derived from a row of full grown bushes capping an adjacent sand-dike; also a large clump on a knoll and in adjacent sandy hollows about 200 yards inland from the coast-guard station, with numerous seedlings appearing in the neighbourhood of the mature plants. In the same year I measured the bared roots of some mature plants growing at the edge of the sand bluffs which had been much undermined by storms and high seas. Though the bushes were no more than three feet high, some of their roots were fully sixteen feet long.

Salix Caprea, L.—This, the rarest of the native Co. Dublin willows, is quite frequent in the dense hazel copses of Lower Glenasmole, a short distance above Bohernabreena bridge, where I counted some dozens of well grown trees last year.

***S. PENTANDRA**, L.—Although this handsome willow has no claim to be considered native anywhere in Co. Dublin, it appears to be now so

far naturalised near the head of Kelly's Glen as to deserve admission to the county flora. In this station, not the Kelly's Glen of the old botanists (Glenasmole), but the more eastern glen, now known by that name, and lying between Tibbradden and Kilmashogue mountains, I have known this willow for fully a quarter of a century. Originally planted here near the old spa well, it is now spread for a couple of hundred yards along the river, not only in full grown trees but forming young thickets in swampy ground, where it grows in association with Alder and *Salix aurita*, and looks quite wild.

SPARGANIUM NEGLECTUM, Beeby.—Abundant by a marshy overflow of the Broadmeadow Water near Fieldstown, and frequent by the Royal Canal above Lucan station, 1903. Probably widespread in the county and throughout Ireland. This plant is very distinct in its fruit characters from typical *S. ramosum*, and appears to be fully worthy to rank at least as a sub-species.

Potamogeton plantagineus, Ducroz.—Occasional in the Royal Canal from Lucan to Clonsilla, 1901. There is reason to fear some error in the previous record for this plant in *Cybele*, 1866:—"Common in ditches in the bogs amongst the Dublin mountains." Year after year it has been searched for in the mountains without success, and it seems probable that the Co. Dublin record may have been founded on some accidental mixing of herbarium specimens. If the above Royal Canal record be taken as the only certain one, then the species must be regarded as an alien for Co. Dublin, introduced by the Canal from the midland counties with other aquatic aliens, and long since become established.

Scirpus fluitans, L.—In pools at the Bog of the Ring, 1903.—A rare species in the county, so far, known to me in only two stations, Howth Head and that just recorded. It appears to be absent from the mountains, although its marked calcifuge character would lead one to expect its occurrence there in bog pools or bog drains.

Carex axillaris, Good.—By the edge of a wet ditch at Castle Bagot, Milltown, 1903.—Not so well marked here as at Malahide, but like most hybrids this is very inconstant in its characters.

C. pallescens, L.—In the course of a tramp over Seecawn mountain and down the Dodder valley in July last with my friend, Mr. W. H. Bloomer, we had the pleasure of gathering this sedge for the first time in Co. Dublin. It grew in moist grassy places by the upper reservoir near Ballymorefinn, Glenasmole. In Mackay's *Catalogue*, 1825, this species is recorded for Kelly's Glen, the name then current for Glenasmole, and eight years later, in the *Irish Flora*, it is recorded for moist meadows at Howth. Wade, too, in 1804 (*Plantæ Rariores*) recorded it for Curragha Bog, a locality doubtfully in Dublin, and now drained. These are the only records previous to the present one, which gives welcome confirmation of a record more than three quarters of a century old. At Howth, the plant appears to be extinct.

C. laevigata, Smith.—By the Slade, Glanasmole, at 1,100 feet, 1903 (W. H. Bloomer & N. C.).—This is the highest station so far recorded for this sedge in Ireland.

Hordeum secallnum, Schreber.—Sparingly by the Ward river at Brackenstown, 1903. This is a very rare grass in the county, unless it has been overlooked, which seems unlikely. The only other recent record is that by Mr. R. M. Barrington in the second edition of *Cybele Hibernica* for Broad Meadows, near Swords, where he found it in abundance in 1891.

The publication of these notes on the Dublin flora offers a convenient opportunity of drawing attention to some doubtful records, chiefly referring to species not unlikely to occur in the county, although the evidence for their occurrence seems at present insufficient. These species, with the evidence in favour of their inclusion in the county flora, are set out below in the hope that some reader of this paper may be in a position to supply me with further evidence either for or against their inclusion. Hitherto, I have failed myself to find any of them in the county, or to get any definite record for them from those best acquainted with the Dublin flora. In the following list *Guide* means the *Catalogue of the Plants of Dublin and Wicklow* published in the British Association Guide of 1878.

Nymphæa alba, L.—Royal Canal, etc., rare : *Guide*.

Stellaria palustris, Petz.—In Curragha Bog, County Dublin : *Wade Rar.* Wet slopes of the Dublin mountains (*Moore*) : *Cyb.*

Myriophyllum alterniflorum, DC.—Frequent in boggy places in Dublin and Wicklow : *Guide*.

Cnicus pratensis, Willd.—On a bog near Killiney Bay, 1814 : *Templeton MS.* Above Marlay : *Ir. Flor.* This species undoubtedly occurs in Wicklow a short distance from the Dublin boundary.

Myrica Gale, L.—In mountainous and boggy situations, Dublin and Wicklow, local : *Guide*. Certainly occurs in Wicklow.

Populus tremula, L.—Kelly's Glen : *Flor. Hib.* Dublin and Wicklow ; rocks and mountains, rather rare : *Guide*.

Rhynchospora alba, Vahl.—Dublin and Wicklow : not unfrequent : *Guide*. Dublin Mountains, not common : *Flor. Howth, App.*

Carex stricta, Good.—In the Bog of Curragha : *Wade Rar.* Dublin, by the side of the Royal Canal, &c. : *Guide*. Wade's record, if it really belongs to Co. Dublin, is of little weight. I cannot discover the authority for the Royal Canal record.

C. curta, Good.—Curragha Bog, Co. Dublin : *Wade Rar.* Foot of the Three Rock mountain above Marlay : *Ir. Flor.* This species certainly occurs in Wicklow.

Every one of these nine claimants for admission to the Dublin flora occurs in one or more of the adjoining counties, and as regards at least two of them, *Cnicus pratensis* and *Rhynchospora alba*, there are good reasons for expecting that their claim will be fully established by further search in the mountain districts.

Sandycove, Co. Dublin.

REVIEWS.

BRITISH LIZARDS.

The Life-History of British Lizards, and their Local Distribution in the British Isles. By GERALD R. LEIGHTON, M.D. Edinburgh : G. A. Morton, 1903. Price 5s. net.

We have had works on the British Reptiles as a whole, but no book had ever been written on the British Lizards alone until Dr. Leighton conceived the plan of the present volume. He is well-known as the author of a little work on the British Serpents, published some years ago.

The present book appeals especially to the field naturalist, to whom the author gives a chapter full of good and sound advice, which greatly enhances the value of the work. The advice he gives is addressed to those who are about to describe an animal to their fellow-naturalists. It is well put, and to the point, and we can strongly recommend the perusal of the chapter to all young zoologists. Another chapter deals with the anatomy of Lizards, and then follows a description of the various kinds inhabiting the British Islands.

The reference to the Common Lizard (*Lacerta vivipara*) naturally interests us most, as it is the only species indigenous to this country. Dr. Leighton observes that it has a marked preference for mountainous districts, which provides one point of contrast with the Sand Lizard. In Ireland this is not at all the case, the Lizard being more common with us in low-lying areas than in hilly parts.

In the appendix Dr. Leighton correctly states (p. 194), that the Common Lizard is generally distributed in Ireland. We fail to understand, therefore, why in the body of the work only Dr. Gadov's opinion should be referred to, according to whom the Lizard has an irregular and local distribution in Ireland. The illustrations, of which there are many, are taken from life, and are mostly excellent. About fifty pages are devoted to giving a careful survey of the distribution of Lizards in the counties and vice-county divisions of the British Isles.

R. F. S.

IRISH LIVERWORTS.

A List of Irish Hepaticæ. By DAVID M'ARDLE. Proc. R. I. Acad., xxiv., B., 13. 1904.

This is a more important work than its title would imply, and consists of over 100 pages. It is stated to be "an attempt to give a full and reliable list of the Hepaticæ of Ireland, as they are known at the present time. It is intended to form Part II. of *Cybele Hibernica*, and is based on exactly the same lines."

The year 1876 was an epoch in the study of Irish Liverworts, when Dr. David Moore published his "Report on Irish Hepaticæ"; 137 species were then described and localised. Since his death in 1879, Mr. M'Ardle has devoted himself enthusiastically to the study of this group of plants, and searched for them in many parts of Ireland, and added largely to our knowledge of the Irish species. The present List is a summary of what has been done since that time, worked out for the 12 botanical provinces of "*Cybele Hibernica*" in the manner of that work. The 137 species of Moore's Report has been increased to 172 in the present List, not a bad result considering the paucity of workers.

After a short Introduction, with remarks on physical features, climate, rainfall, and peculiarities of the Hepatic flora, a table is given of distribution through the districts, and a bibliography, followed by the detailed account of species and localities throughout the botanical provinces of Ireland.

Much space is taken up in this list by synonyms, which seem out of place in a work of the kind; space which might have been profitably devoted to notes on the habitats, season of fruiting, and similar observations which would have been of interest and importance in regard to these little known plants from one so familiar with their habits in their favourite haunts in the south-west of Ireland.

Mr. M'Ardle gives much space to varieties, no less than 63 of which are recorded. Several of these are described here for the first time, such as the var. *erecta* of *Lejeunea patens*, Lindb., and var. *minor* of *Radula complanata*, L. For the curious proliferous states described in certain species (interesting illustrations of which appeared some time since in the *Irish Naturalist*), it would have been better to adopt the term *forma* than *variety*, as is done by Limpricht.

The most important feature of the work is the detailed account of all that is at present known of the distribution of the species and varieties of Hepaticæ throughout Ireland. The result is a most useful compilation. It can now be seen at a glance what has been done and what remains to be effected, and how rich the Irish scale-moss flora is, as might be expected from the moist and equable climate of the Emerald Isle. Every page shows how largely Mr. M'Ardle has contributed himself to the result (while at the same time the work of others is fully recorded), and how successfully he has followed in Dr. Moore's steps in extending our knowledge of this portion of the Irish flora.

As far as we have tested it, the summarising of records seems to have been carefully done, and we have noted few omissions, although there are many duplications of records. *Cesia revoluta*, Lindb., has been very properly omitted, but another species, *Kantia Sprengelii* (Mart.), recorded from Tanderagee, Co. Armagh, 1898, by Rev. H. W. Lett in the "Moss Exchange Club Report" for 1902, should find a place in our list.

If we have some adverse criticisms to offer, it is chiefly in matters of detail. Sufficient prominence has not been given to the work of Templeton, who was the first botanist who thoroughly studied Irish Hepaticæ. Early records are frequently quoted at second hand from Hooker, 1816, or Taylor's work, 1836, when there are earlier ones in Templeton's MSS. For example, on 12th July, 1815, in company with R. Brown, Hooker, and Stokes, Templeton collected *Cephalozia curvifolia* (Dicks.), *Pleurozia cochleariformis* (Weiss), *Herberta adunca* (Dicks.), and other species on Muckish, Co. Donegal.

In the Bibliography there is no mention of Templeton's "Hibernian Flora" MS. deposited at the Belfast Museum, College Square, which contains drawings with localities and dates for the Irish species then known. It is a pity that this list is not complete. Reference should have been made to the "Reports of the Moss Exchange Club," 1896 1903, "Notes on Hepaticæ of Ulster" (*Irish Nat.*, 1898), and other scattered papers and notes on the subject. If complete, this list of authorities would have been much more valuable than it is.

In the quotation of records in a list of this kind it should always have plain on the face of it who is the collector and what is the source of the record. In "Cybele Hibernica" and "Irish Topographical Botany" this has been secured admirably by the consistent use of brackets for collectors' names, and italics for authors quoted. We fear that the abbreviations used in the List and the mode of quotation will often prove misleading in confusing authors with collectors to persons not familiar with the facts.

In the case of the names of species, we note that the customary brackets have been omitted where two authorities occur. This is not a safe practice, though it saves trouble.

It is well known that Ireland has a very interesting flora of Hepaticæ, with a group of Western or Lusitanian species not found in Britain, but peculiar to the Atlantic coast. Botanists will turn with greatest interest to the section headed "Peculiarities of the Irish Hepatic flora" to see if the researches of the last quarter of a century have thrown any further light on this interesting problem of distribution. This portion of the work is, however, disappointing, it is so brief. The example set in the interesting introduction to the "Cybele" and "Irish Topographical Botany" has not been followed. Certain species are classified under the following headings:—Alpine or sub-alpine Hepaticæ, tropical, tropical South American, North American, British, and Irish types. We should have been glad to have further explanations and remarks upon these types.

Recent investigation has thrown little fresh light upon the subject. Several species have been added to the group of endemic Irish species. But as a set-off against this, some which were always considered real natives up to a few years ago, have been found in Moidart on the west coast of Scotland by Mr. Macvicar. On the whole, recent investigation has tended to detract from rather than add to the unique character of this portion of the Irish Flora. Many species thought to be native only in the south-west have now been found in other parts of Ireland, Wales, the English Lake District, but especially on the north-west coast of Scotland. One genus, however, *Lejeunea*, whose headquarters is in South America, is much better represented here than in Great Britain, three species (*L. flava* (Swartz) (a common Andine species), *L. Holtii* Spruce, and *L. diversiloba* Spruce) only growing on this side the channel.

It is interesting to compare our Irish list with the "Census of Scottish Hepaticæ" just published by Mr. Symers M. Macvicar in the "Annals of Scottish Natural History," Jan., 1904. In this, 205 species are recorded for Scotland, of which no less than 16 are additions to the British flora made within the last few years, since the publication of Pearson's "Hepaticæ of the British Isles," wherein 224 species are described. Of these *Jungermania exsectiformis*, Breidler, has lately been found by Mr. M'Ardle in Ireland, and others may be expected to occur. As might be expected, we are much poorer than Scotland in northern and alpine species, but richer in southern and Atlantic types.

Ireland, as compared with Great Britain, is richer perhaps in Hepaticæ than in any other group of plants; in spite of her poverty in alpinæ, about two-thirds of the British species are to be found in Ireland.

We hope that the publication of this laborious and useful work will stimulate bryologists to try and fill up the gaps which remain, and direct attention to some of the obscure and critical genera, such as *Riccia* and *Fossombronia*, which have been neglected hitherto.

C. H. WADDELL.

ALPINE BUTTERFLIES.

The Butterflies of Switzerland and the Alps of Central Europe. By GEORGE WHEELER, M.A. London: E. Stock, 1903. Pp. 162. Price 5s. net.

This excessively condensed and abbreviated fauna will doubtless prove of great value to collectors in the Alps who have already some knowledge of the classification of Butterflies, but the extreme brevity and often total absence of generic characters spoil the book for use by beginners. The author seeks to fill the gap caused by the selling out of Kane's "European Butterflies," and he specializes in the listing and description of varieties and aberrations, as well as in the production of very carefully compiled lists of localities. All the Irish species of Butterflies are included in the fauna of Switzerland.

G. H. C.

USE-INHERITANCE.

The Direction of Hair in Animals and Man. By WALTER KIDD, M.D. London: A. & C. Black, 1903. Pp. 154. Price 5s. net.

In this work Dr. Kidd deals more extensively with an interesting and suggestive, though somewhat neglected subject, than in the little book on "Use-Inheritance," reviewed in these pages two years ago (*Irish Nat.*, vol. x., p. 252). He seeks, to quote his own words, "to co-ordinate the scattered facts of the direction of the hair in the lower animals and man, to furnish interpretations of most of them on mechanical principles, and to supply an answer to the question, 'Can acquired characters be inherited?'" He shows that whorls, featherings, and crests of hair are produced in the skin lying "over a region where *strong, very frequent, divergent* muscular action prevails," while points of contact with the ground or other opposing surfaces produce "reversed areas" of hair. As an example of the latter contention, it is stated that such a "reversed area of hair on the extensor surface of the ulna is only found in those members of these groups [Primates, Carnivora, and Ungulata] which have the habit of resting this surface against some supporting object." On the same mechanical principles, "the connection of tropical rain with the peculiar thatch-like slope on the extensor surface of the fore-arm [in many Primates] would be that the rain tends to produce the slope, and not that the slope is produced or adapted for the purpose of running off the rain." Much attention is paid to the differences in the directions of the hair streams on Man and his nearest allies the Apes, and evidence is brought forward to show how these differences can be accounted for by differences in posture and habit. While it cannot be claimed that Dr. Kidd has proved the power of the Lamarckian factor in evolution, he has at least made it easier to believe that some points in animal structure may be due to its influence.

G. H. C.

INSECT MIGRATION.

The Migration and Dispersal of Insects. By J. W. TUTT, F.E.S. London: Elliott Stock, 1903. Pp. 132. Price 5s. net.

Everyone has heard or read of the migration of birds, but the migration of insects is a less familiar subject. Strictly speaking, the two are not comparable, since among insects "migration" is not a series of regularly recurring journeys to and from breeding-haunts, but the travels of individuals or flocks, often over large areas, to find new regions in which to live and settle. In this small (and seemingly expensive) but closely printed book, Mr. Tutt has laid entomologists under a deep obligation by compiling from his own observations, and from numerous published sources, a mass of detailed information on this interesting question. While Hemiptera, Orthoptera, and Odonata are not neglected, the larger portion of the book, by far, is devoted to the migratory movements of the Lepidoptera. Species of especial interest in this connection are the European *Pyrameis cardui* and the American

Anosia archippus. Specimens of both have been found hundreds of miles from any possible permanent breeding-place for the species.

We could have wished for Mr. Tutt's views at greater length on the influence of the migration, or, more correctly, immigration, of insects on their present geographical distribution. He believes, however, in a principle well illustrated in Ireland, that "we have, in almost every region, insects representing an exceedingly ancient fauna, intermixed with comparatively recently introduced forms." In his remarks on the geological antiquity of the insect orders, he seems to have strongly over-stated his case. What shred of evidence can be adduced in support of the differentiation of these orders—including even the highly specialised Lepidoptera, Hymenoptera, and Diptera—"before the deposition of the Silurian strata"? Neither the records of the rocks, nor the probable course of insect phylogeny, support such an extreme view.

G. H. C

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Baboon and a Lemur from Col. Mackintosh, a Chilian Fox from Dr. R. H. Oulton, a Yellow-hammer from Messrs. Williams and Sons, three Kestrels from Mr. J. Clifton, two Barbary Doves from Miss Cordeaux, a Raccoon from Capt. C. V. Kendall, six Chaffinches, four Greenfinches, three Great Tits from Mr. W. W. Despard, and a Sparrow-hawk from Sir Douglas Brooke.

One of the young lionesses has recently had her eye badly injured while playing with her sister. It was not found possible for the keeper to apply a soothing lotion, but her companion is doing all in her power to alleviate the suffering of her sister by frequently licking the sore eye, and it is hoped that the eye will be saved by this friendly animal doctor. An experienced elephant trainer, engaged by the Council, has arrived, and is busily engaged in training the Padmahati to carry the saddle so that the children may take rides round the Gardens on its back.

JANUARY 26.—Annual Meeting in the College of Physicians. Prof. D. J. CUNNINGHAM, F.R.S., President, in the chair.

The Report presented by the Hon. Secretary, R. F. SCHARFF, Ph.D., gives an excellent account of the progress of the Society. The attendance of visitors during 1903 (195,177), shows a slight falling off as compared with 1902 (when the numbers were 197,603), and the receipts were £2,671, as against £2,700 in the previous year. Nevertheless the statement of accounts shows that an adverse balance of over £500 at the beginning of 1903 has been practically extinguished, owing to the wise policy of the Council in obtaining new animals by exchange rather than by purchase. The disasters suffered by the Gardens during the terrible storm of February 28th (graphically shown in a photograph published with the Report), were quickly repaired, thanks to the generous gifts of

friends of the Society. The loss of a faithful keeper, and of many valuable animals are sad features of the Report; the old female Elephant, "Zita," was wisely shot after she had crushed her keeper M'Nally to death, while two Orang-utans, Butler Bey's beautiful Giraffe, the male Camel, a remarkably fine female Zebra, and a Capybara that had lived in the Gardens for six years, also succumbed. To balance these losses the young Elephant, given by the Duke of Connaught, the two young Giraffes sent from the Soudan by the Sirdar, and two Himalayan Bears, given by Mr. C. W. Dunn, have been received, and are in very good health, while prominent among the births in the Gardens during 1903 were two litters each of three Lion-cubs—two males and a female, in April, by "Romulus" out of "Lady Macbeth," and one male and two females, in December, by "Pluto" out of "Dido." "Pluto" was the only representative of the old Dublin strain, but with the advent of these three promising cubs the succession of true Irish Lions should be secured. The silver medal for photographs taken in the Gardens has been awarded to Mr. J. E. Sullivan.

After the adoption of the Report a hearty and well-deserved vote of thanks for his long and invaluable services to the Society was passed to the retiring President, Prof. Cunningham, whose removal to Edinburgh is deeply regretted by all the Council. (An excellent portrait of Prof. Cunningham adorns the printed Report). In responding to the expression of feeling, Prof. Cunningham announced the election of the Lord Lieutenant to the Presidency, and the re-election of Dr. Scharff and Mr. A. E. Goodbody as Hon. Secretary and Treasurer, respectively. Vacancies among the Vice-Presidents are filled by the election of Prof. A. Birmingham and Justice Ross, while Professor A. F. Dixon and Mr. T. Martin fill vacancies on the Council.

DUBLIN MICROSCOPICAL CLUB.

JANUARY 13.—The Club met at Leinster House.

D. M'ARDLE exhibited a minute red alga, *Pleurococcus miniatus*, which was growing on *Lejeunea microscopica*. It occupied most of the interior of the swollen leaf lobes, and the *Lejeunea* had the appearance of bearing copious antheridia. It was collected at Pontoon, Co. Mayo, in 1901, where the *Lejeunea* grows on the bark of Alder in neat strata, and in fruit.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

JANUARY 28.—The President (Prof. SYMINGTON, F.R.S.) in the chair. JOHN M. FINNEGAN, B.A., B.Sc., read a paper on "Radium."

FEBRUARY 17.—W. SWANSTON in the chair. R. LLOYD PRAEGER lectured on "A Historic Trial: The Limavady Gold Ornaments Case."

BELFAST NATURALISTS' FIELD CLUB.

JANUARY 19.—The President (W. J. FENNELL, M.R.I.A.I.) in the chair. W. H. PHILLIPS read a paper on "Varieties in British Ferns," which was illustrated by a number of fresh fronds from his extensive collection of plants.

Mrs. B. HOBSON read a paper entitled, "Some Souterrains in Antrim and Down." The paper was illustrated by lantern slides, some of which were photographs of carefully prepared plans by Miss Hobson from the sketches and measurements of the writer.

The third paper was read by W. H. WORKMAN, M.B.O.U., on "Birds and Nests," profusely illustrated by lantern slides, most being original. The pugnacity of the Great Black-backed Gull, the voracity of the Black-headed Gull, the wide distribution of the Warblers, and the increase of the Starling in recent years were commented upon.

R. BELL read a paper entitled "Notes on the Discovery of Dopplerite in Sluggan Bog." Mr. Bell said that Sluggan Bog, in the parish of Drummaul, is the largest bog in Co. Antrim, containing upwards of one thousand acres. This district was the scene of a remarkable bog-burst which occurred on the 19th September, 1835. The peasantry of the district were much alarmed as a large body of the bog moved rapidly towards the River Main, covering up corn-fields and meadows and roads, in some places to a depth of twenty feet. The bog offers to naturalists a tempting field for research. A road-cutting at Ballylurgan shows a fine section of peat resting on tough boulder-clay, containing many erratics of North Antrim type. While searching among the peat in Mr. McGroggan's peat farm, he discovered a peculiar black layer, of the consistency of stiff jelly. Further investigation showed that this material occurred *in situ* at a depth of seven feet below the surface. It was about three inches in thickness, thinning out irregularly to the adjoining peat. The substance is like a velvety black jelly, which becomes hard on drying, and breaks with the conchoidal fracture peculiar to amorphous substances. As it was unknown to local geologists, samples were sent to Mr. Richard J. Moss, F.I.C., F.C.S., of Dublin, who made an analysis of it, and determined it to be Dopplerite, a substance hitherto unrecorded in the British Islands, though found in Germany and Switzerland. The discovery seemed of such interest that it formed the subject of a paper read before the Royal Dublin Society. The papers were discussed by the President, Miss Andrews, Messrs. Gray, Hamilton, Patterson, May, Welch, Foster, and Milligan. Two new members were elected.

FEBRUARY 2.—The members were invited by the President and Mrs. Fennell to a reception in the Museum. Tea was dispensed from eight till nine o'clock, and afterwards Dr. TEMPEST ANDERSON, F.G.S., delivered a lecture on the West Indian volcanic eruptions in 1902, in which he gave a most interesting account of a visit paid by him, in company with Dr. J. S. Flett, to the scene of the disturbances in St. Vincent and Martinique.

BOTANICAL SECTION.—JANUARY 23.—Rev. C. H. Waddell, B.D., delivered the second of a series of lectures on the *Umbelliferae*.

DUBLIN NATURALISTS' FIELD CLUB.

FEBRUARY 6.—EXCURSION TO HOWTH.—Twenty members and friends took the 1.50 train from Amiens-street to Howth station. The party, under the leadership of Mr. F. O'B. Ellison, walked round the cliff path to the summit. On the way they had the opportunity of observing a number of very interesting geological features, such as the outcrop of dolomite in the Harbour, showing characteristic contraction spaces, the cliffs of glacial sands and gravels under the Martello Tower, the remarkable breccia in Balscadden Bay, which fills up the great fault between the Cambrian and Carboniferous rocks, isolated sea-stacks showing the effects of shore erosion, and andesite dykes intersecting Cambrian rocks. When the party reached the summit they had tea, returning to Dublin by the 5.5 train from Howth after a very enjoyable afternoon.

FEBRUARY 9.—The President (F. W. BURBIDGE, M.A.) in the chair. The President delivered an address dealing with the forces brought into play by the action of vegetable life. G. H. PETHYBRIDGE, PH.D., brought forward the question of the relation of local scientific societies to the British Association, and made many suggestions as to the steps which might be taken to advance scientific research. J. ADAMS, B.A., read a paper on the occurrence of Yew in a Queen's County bog. The paper dealt very fully with the occurrence of fossil woods in the bogs of Ireland, and showed that a great amount of work remained to be done in the direction of identifying the correct species of the different trees that occur in the prehistoric levels of Irish bogs. Mr. PRAEGER pointed out the necessity of original work being done in this matter, most writers on the subject being content to collect what some previous writer had said. Mr. BURBIDGE gave instances of the occurrence of Yew in Ireland. F. O'B. ELLISON, B.A., gave an elaborate and graphic account of the excursion held on Saturday, February 6. Mr. Howard Fleming was elected a member of the Club.

ULSTER FISHERIES AND BIOLOGY ASSOCIATION.

JANUARY 27.—The first Annual Meeting was held in the Museum, College Square N., Belfast, Sir R. L. PATTERSON, D.L., F.L.S., in the chair. In submitting their First Report, the Council point out that the Association has only been nine months in existence, and that of necessity much of that time was occupied in making arrangements for commencing the various branches of work. These arrangements are now practically complete, and the Council look forward with confidence to the accomplishment of much valuable and original research during 1904. A house has been secured at Larne Harbour, and a fine steam

launch purchased. The appointments of Prof. Gregg Wilson, D.Sc., as honorary director, and of Joseph Pearson, B.Sc., as naturalist, have already been recorded in the *Irish Naturalist*.

All the property of the Association is covered by insurance, and a portion of the life members' fees has been invested as a nucleus of a building fund. The Council recommend that an earnest and vigorous effort should be made this year to obtain funds for a combined laboratory and aquarium, the erection of which would undoubtedly give a great impetus to the work of the Association, and prove a valuable means of instructing and interesting the general public in our local marine zoology.

The Council gladly avail themselves of this opportunity of stating that the whole success of the Association's work is due to the enthusiastic and self-sacrificing manner in which Dr. Wilson has entered on his self-imposed duties. It is the merest truism to state that without Dr. Wilson's services the work of the Association could not have been carried on.

In addition to having virtually founded the Association by his munificent gift of £200, Sir Hugh Smiley has on several occasions placed his steam yacht "Fire-Fay" at the disposal of the working members, and thus enabled them to engage in deep-water collecting. Dr. J. St. Clair Boyd also generously lent his yacht for many days during the summer. To Viscount Massereene and Ferrard thanks are due for the loan of his steam launch for several days on Lough Neagh, and the Bann Fishery Company also lent their launch on the same lake. The Department of Agriculture kindly sent their fishery steamer "Helga" on several occasions to Larne Lough.

The receipts of the year amount to £628, and after investing £89 in consols, over £35 remains as balance with the Treasurer.

The Director's Report describes the arrangements in the temporary laboratory, stating that there are tables suitable for microscopic work, and a Hearson's paraffin bath and a Cambridge microtome have been provided for sectioning. All ordinary re-agents have been stored. A library of reference books has been started, and already contains many valuable works. Two small tanks and simple ærating apparatus have been presented to the Association, so that animals may be kept in life.

The work of the Association has been necessarily somewhat limited during the past year. Much time has been spent in collecting material for future study, and the naturalist of the Association and the boatman have been indefatigable in carrying on this important duty. Many days have also been taken up by the necessary work of starting beginners on the investigation of the special groups or subjects assigned to them. Now, however, work is being carried on steadily by a considerable number of members and associates, who have undertaken special groups. Mr. Thomas Thornton, A.R.C.S., is studying the Algæ of Larne District. Messrs. Gough and Pearson are examining bottom deposits with reference to their character and origin. Mr. Cunningham is engaged in an extensive investigation of surface currents. Professor

Lorrain Smith has undertaken the bacteriological investigation of certain shellfish; and Professor Milroy has commenced work on the physiological effects of light on the eyes of fishes.

Besides these workers numerous members and others have visited the Marine Station at Larne Harbour. At Easter, a party of fifteen members worked there for several days, and almost every Saturday one or more visitors join the naturalist in his dredging expedition. Professor Brady, F.R.S., of Newcastle, has been the only zoologist who has come from a distance to work; but several other prominent naturalists have indicated their intention of visiting the laboratory, and they will, of course, be heartily welcomed.

Besides marine work the Association has undertaken the study of the fauna of Lough Neagh. This is carried on without a special laboratory. Mr. Pearson makes periodical visits of inspection, collects material and statistics, and with the help of several other workers tabulates the results, which promise to be of importance in connection with fishery problems.

The naturalist's Report describes the details of the dredging and trawling work. Physical observations, notes of deposits, records of the contents of fish's stomachs are carefully made. At Lough Neagh, which is visited for about two days a month, special attention is paid to *Mysis relicta*.

The adoption of the Reports, moved by the Chairman, seconded by the Rev. PRESIDENT HAMILTON, and supported by the Lord Mayor of Belfast, was carried unanimously.

NOTES.

BOTANY.

Catenella repens at Ballygally Head.

Catenella repens, Lightf., which belongs to the group of Red Seaweeds and is also known by the name *Catenella Opuntia*, Grev., was found on 23rd September, 1903, on the rocks beneath the old castle at Ballygally Head, Co. Antrim. It grew on the shady surfaces of the crevices near highwater mark. The specimens possessed reproductive organs, but whether these were tetraspores or young stages of cystocarps has not yet been fully determined. The only Irish localities for this plant given in Batters's "British Marine Algæ" (1902), are Bantry Bay and Dublin Bay. As shown by Harvey-Gibson (*Journ. Linn. Soc.*, 1892), the figure of the cystocarp, with the accompanying description in Harvey's "Phycologia Britannica," is altogether erroneous.

J. ADAMS.

Royal College of Science, Dublin.

Glyceria festucæformis in Ireland.

The discovery of this grass last summer in Co. Down, and the notices of it in the *Irish Naturalist* for October, 1903, by Mr. Praeger, and in the *Journal of Botany* for November, 1903, by Dr. Rendle, are most interesting. Mr. Praeger, who was the lucky finder, is confident that the plant is indigenous to the east shore of Strangford Lough, and he argues that it was impossible for the seeds to have been introduced from the shores of the Mediterranean Sea, which is the nearest place to Ireland where this *Glyceria* is undoubtedly native. In the interests of science I wish to point out why I am unable to share this view, and why I have much more than a shadow of doubt as to its being indigenous on the shore of Strangford Lough. There are reasons why I think it not only possible but extremely probable that the presence of this grass in Co. Down is due to its introduction by a happy chance at no very remote date.

It is true, as Mr. Praeger writes, that, "in the whole of Strangford Lough there is no port where foreign vessels call. The sea-traffic is confined to small local boats with cargoes of coal, bricks, and so on." But I am far from thinking that "the introduction by land is equally out of the question"; for there is a way by which it was quite possible for the seeds of this Mediterranean shore grass to have got on the shore of Strangford Lough by a land journey of eight miles from the nearest Irish seaport—it occurred to me, when I first heard of Mr. Praeger's discovery, and previous to the publication of his account of it in the *Irish Naturalist*, and I am surprised how it escaped his experience and acuteness.

About eight miles straight across the water north-west from the Ards locality for the *Glyceria*, is the little town of Comber, situated half a mile from the shore of Strangford Lough. It is eight miles by rail from the great sea-port of Belfast, and in it is a well-known old established and flourishing distillery (there are actually two distilleries which have been working since the year 1825), where large quantities of cereals from various sources are from time to time used in the manufacture of whiskey.

A small stream locally known as the River Inler, or Comber River, runs past these works and supplies them with water, while the tide from Strangford Lough rises to a point in it between the upper and lower distilleries; and any refuse and sweepings of the lofts from the distillery which may get into the stream are carried by fresh and salt water into Strangford Lough. When this occurred to me, and I reflected that many alien plants are from year to year found growing on waste ground and road-sides near distilleries in other places, the seeds having been imported with foreign grain, I inquired from the manager of Comber distillery whether grain from a Mediterranean port was ever used by his firm; and in his reply he informed me that foreign barley had been used in Comber distillery, and that so late as the year 1892 he had a cargo of barley imported *via* Belfast from Algeria.

But in addition, there are in Comber, besides the distillery, large flour mills, which, though now, like most similar mills throughout Ireland, idle, yet formerly did a large business and used a considerable quantity of Egyptian wheat in the course of the trade. And my correspondent has very kindly taken the trouble to ascertain that before this Mediterranean wheat was ground, it had all to be washed, so that various seeds from this source must have found their way into the Comber River.

And when a map of Co. Down is examined, it is easy to see that at every ebb-tide whatever floating matter, such as seeds or the like, is carried by the Comber River into the head of Strangford Lough must thence go south-east, which is precisely in the direction of the Ards shore, and when it is borne in mind that the prevailing winds in Ireland are from the west, it does not take a very elastic imagination to suppose seeds from Comber distillery and flour mills finding a resting place where were gathered the plants of *Glyceria festucaformis* on the Ards shore.

While the fact that these plants were found by Mr. Praeger nearer the sea-water margin than the *Aster Tripolium* and *Glyceria maritima* of the indigenous flora, suggests their having only lately come there, and that they have not yet had time to mingle more a-field with the true natives.

H. W. LETT.

Loughbrickland, Co. Down.

I have read Canon Lett's statement with much interest. In the following remarks I treat his hypothesis at some length, because it seems to me that we field botanists sometimes fail to pay due regard to the nature and value of evidence of cases of this kind, and proceed on lines which cannot be classed as either logical or scientific. First, let me say that I was not unmindful of the existence of distilleries and former flour-mills at Comber. On many occasions during the last twenty years I have studied the alien plants which languish on the rubbish heaps there.

Canon Lett's theory is that seeds of *Glyceria festucaformis* came to Comber with foreign grain, were thrown into the Comber River, carried by wind and tide down and across Strangford Lough, and obtained a foothold along the several miles of coast on which at present the plant is known to grow. Now, to bring the hypothesis within the range of probability, several factors must contribute. First, some evidence is required of the probability, or even possibility, of the seed of the grass reaching the distillery or flour-mill. What is the case as regards this point? The foreign grain which is quoted as having been used at Comber, is barley from Algeria, and wheat from Egypt. Now, *G. festucaformis* does not grow in Algeria, nor in Egypt, nor indeed anywhere on the southern shores of the Mediterranean; and with the failure of this key-stone of the arch, where is our hypothesis?

But despite this reverse, let us "in the interests of science," pursue the matter, and see whither the next step in the hypothesis will lead us. Assuming, for the sake of argument, that grain from, say Northern Italy, where the plant *does* grow, had at some time been imported, it surely requires an elastic imagination to conceive how the seed of a plant which affects such a habitat as *Glyceria festucaeformis* is likely to become mixed with cereals. The bulk of distillery and corn-mill aliens are weeds of cultivated or waste ground—Melilots, Medicks, Sisymbriums, Silenes, and a hundred more—and plants of other situations, such as sea-shores, or marshes, or woods, are generally conspicuous only by their absence. An examination of the Comber casuals shows that they are no exception to this rule.

Would it be rational to doubt that *Scirpus triquetus* is native on the Shannon estuary, because it could be shown that one of the Limerick flour-mills had, at some time or other, used wheat that came from the South of England? Yet the Limerick casuals are legion, several of them have established themselves, and *S. triquetus* grows almost within a stone-throw of some of these.

Then further. Having, by some strange chance, got the seeds of our maritime grass (they are not particularly light seeds, nor gifted with any special means of dispersal) mixed with our foreign grain, and that grain duly transported to Comber, and the seeds safely launched thence into the river, how comes it that, though capable even as a recent immigrant of forming an extensive colony across eight miles of sea—a remarkable feat—the plant has not established itself about the Comber River, where the ground is suitable, and where there must have been a hundred seeds floating for one which reached its distant actual station? Yet *G. festucaeformis* has never been detected in that well-worked ground. Could it even be shown that any one of the Comber aliens has spread down the river and established itself, this at least would be a straw to which we might cling. But even this collateral evidence is not forthcoming. I need not pursue the matter further. Of course it may be argued that plants *do* spread to unexpected places, and that we cannot prophecy the range even of an alien from the known facts of its introduction. Quite so. But in the present case, the fraction representing the probability of each step in the hypothesis is so small, that the product is a fraction which is for practical purposes insignificant.

Not only in our distilleries and flour-mills, but in stores, and indeed in every grocer's shop and hen-run over the country, foreign grain is to be found. It is little exaggeration to say that seeds of foreign plants rain down year by year all over our islands, and this it is that makes the work of the field botanist now-a-days so difficult; but, unless built on some foundation of fact, and supported by buttresses of probability, a hypothesis raised on this circumstance alone will not stand. Could Canon Lett—who, by the way, does not say that he has studied either the plant, or its Irish habitat, or the Comber casuals—put forward a connected argument such as Mr. Colgan (*Journal of Botany*, xxxii., 104. 1894) introduced in connection with Prof. Areshoug's plea in favour of

Artemisia Stelleriana, then indeed the claim of *Glyceria festucaformis* to native rank would be seriously imperilled. But at present the facts seem to point the other way. It is the very absence of any working hypothesis, such as Canon Lett endeavours to set up, coupled with the mode of occurrence of the plant and its relations to its environment, that has caused me to believe that it is native. The working out of its distribution in the North of Ireland will probably throw light on the question. It will afford me much gratification if Canon Lett will help in this.

R. LLOYD PRAEGER.

Dublin.

ZOOLOGY.

Lepidoptera at Wexford.

I had an opportunity, during a brief visit, of looking over the Lepidoptera which my friend Mr. J. H. Johnston has captured in the neighbourhood of Wexford. Though prevented by the pressure of business from pursuing his collecting with closeness, yet Mr. Johnston has managed to pick up some nice enough things, and perhaps he may be encouraged by his success to continue his entomological researches with renewed vigour. What he has taken suggests very pleasing possibilities in the district, and from what I saw I should say that it would be productive of insects.

Pyrameis cardui, *Argynnis paphia*, *A. aglaia* and *Satyrus semele* were the most interesting among the butterflies; the two last-named were captured at Rosslare, where they would find congenial quarters. It has been suggested to me that variation somewhat in the direction of the var. *valesina* of *A. paphia* might be expected to occur in Irish *A. aglaia*. I have never seen anything of the sort myself, nor has Mr. Kane noted any such variation; still it may be present and it would be worth while for any collector who is where the butterfly is abundant to make a search for such a variety.

Among the moths the following are worthy of mention:—*Cherocampa porcellus*; *Procris statice* taken on the lawn just in front of Mr. Johnston's house, quite plentiful and very fine; *Dasychira pudibunda* captured sitting on a thorn hedge freshly emerged, not previously recorded from Wexford; *Dianthea cucubali* taken in a field adjoining Mr. Johnston's house, the food plant of the larva is plentiful in the immediate neighbourhood; *Pachnobia rubricosa*; *Chariclea marginata*; *Euclidia mi*, a beautiful dark specimen; none of these three seem to have been previously recorded from Wexford. Besides these Mr. Johnston has specimens of *Pyrausta ostri-nalis*, *Pyralis farinalis*, *Hydrocampa nymphaealis*, *Platyptilia Bertrami*, *Acipitilia pentadactyla* (quite a number of this beautiful plume were taken last summer); *Spilodes urticalis*, *S. verticalis* and *Crambus pascuellus*.

W. F. JOHNSON.

Poyntzpass, Co. Armagh.

Waxwings in Ulster.

I am indebted to Mr. W. C. Wright, of Belfast, for the following additional information:—A Waxwing was shot a few days before last Christmas (1903) at Glasgort, near the Bann. Sex not determined. A male was shot at Ballydevitt bleachworks, Co. Londonderry, in December, 1900, while feeding on haws.

ROBERT PATTERSON.

Holywood, Co. Down.

A Confiding Robin.

During the recent frost (December) a hen Robin took up her abode in my house for a week or more. She flitted about the different rooms and passages, but particularly liked the dining-room, when we were all assembled round the fire, and at the table, off which she ate crumbs, and would actually perch on the books or magazines we held in our hands reading. She generally roosted on a picture-frame near the fire-place, and did not in the least mind the noise and talk of the children. Every day, about 12 o'clock, she went out for her lunch of earth-worms, but always returned in the afternoon, though she could never induce her mate to come in and share the warmth and comfort; he seemed most disconsolate outside, flying from window to window. Should the frost return, we expect another visit from our little friend.

J. H. JOHNSTON.

Wexford.

Snow-Geese.

Having sent some time ago notes on the Green Sandpiper and White Missel-Thrush, I have been since eagerly looking out for the Snow-Geese (*Chen hyperboreus*), four of which I observed since the 1st of the month. During the recent snow they flew over my head within 40 yards and I could have had an excellent shot, had I a gun at the time; a man in Foxford got a chance shot at one while sitting on the water, and knocked it over, loosing a quantity of feathers; however, it got away, badly wounded I suggest. I have not heard of anybody's shooting one since; probably the wounded bird has succumbed to its wounds by this. The Moy overflowing its banks here, covers some acres of land, which protects the Geese against the ravages of poachers, leaving them undisturbed; the only option of getting at them would be a "punt," but as they are on preserved ground I should think there would be a bad chance of securing a specimen. At a glance I saw the quill feathers were black, remaining plumage pure white, bill, legs, and feet red.

GODFREY F. KNOX.

Belgariff, Foxford.

NOTES ON THE KERRY FLORA, 1903.

BY REGINALD W. SCULLY, F.I.S.

IN the following notes the more interesting plants found last summer in Kerry are recorded. A visit of my friend, the Rev. E. S. Marshall, resulted in several critical plants being added to the county list, while a good deal of attention was given to the *Rubi*, the results of which I hope to publish later on. I take advantage of this opportunity to withdraw a few of my earlier Kerry records, further examination of several difficult plants making this necessary.

In the following list, observations made by Mr. Marshall and myself when working together, are distinguished by the initials *M.S.*; records without initials are my own. Additions to District I. of the "*Cybele Hibernica*," 2nd edition, are indicated as usual by "I.", while those followed by "1" or "2" are additions to the Kerry sub-divisions of "*Irish Topographical Botany*."

Fumaria Boræi, Jord.—Roadside bank, about two miles east of Headford Junction: *M.S.* ("typical"—H. W. Pugsley).

Nasturtium palustre, DC.—Frequent in old river beds and wet fields east of Farranfore.

Teesdalla nudicaulis, R. Br.—The great storm of February, 1903, seems to have totally washed away the Killarney station for this plant recorded in the *Irish Nat.*, 1902, the only one known in the south of Ireland. A similar fate has also nearly overtaken the *Cerastium arvense* locality recorded in the same place. A careful search, however, resulted in the discovery of a fragment or two of the *Cerastium* still surviving, and I can only hope the *Teesdalia* will reappear; no trace of it could be found last year.

***Dianthus plumarius**, Linn.—It is interesting to note that this plant, recorded in the *Irish Nat.* of last year from the Castletlough ruins, Killarney, was found in the same locality "in considerable quantity," by the Rev. W. M. Hind on June 27, 1856 (*Phytologist*, 1857, p. 25). It furnishes a good instance of how persistently plants cling to a locality when once established. In this case, however, after nearly fifty years, it is no longer "in considerable quantity."

Geranium Robertianum, Linn., var. **purpureum**, Vill.—Stony beach at Cromane, Castlemaine harbour, and seems to be frequent in the county in such situations: *M.S.*

Potentilla procumbens, Sibth.—Quite a frequent plant in the county.

Potentilla procumbens × **Tormentilla**.—Seems also frequent; some new localities are: in the Home Park; Ross Island and Glena, Killarney; Clydagh valley, Upper Glenflesk: *M.S.*

Pimpinella Saxifraga, Linn.—Sparingly near the Lake Hotel, Killarney; the second Kerry locality.

Anthriscus vulgaris, Bernh.—A further examination of the only Kerry locality, near Tullig, proves this plant to be in great plenty, and thoroughly established on roadside banks and ditches for a distance of nearly three miles: *M.S.*

Oenanthe Phellandrium, Lam.—I. 2. Thinly scattered round Parkmore pond, east of Farranfore. This is the only locality I know of in the county for this long expected plant. As this pond seems to have been artificially made many years ago, an element of doubt must attach to the standing of this plant here.

Galium erectum, Huds.—I. 1, 2. In some plenty on a rough bushy slope, near the north end of Caragh Lake. Sparingly in two or three spots in the Home Park, Killarney: *M.S.* I am now inclined to think this plant a native in the south of Ireland; both its Caragh Lake and Roche's Point localities seem to be without suspicion of introduction. On examining my 1901 *G. Mollugo* from the West Park, Killarney, it seems to be inseparable from the above, and should, no doubt, be referred to *G. erectum*.

At present the claim of *G. Mollugo* to a place in the Kerry flora rests on its occurrence for some years past in the Workhouse grounds, Killarney, where, however, Archdeacon Wynn failed to find it last year.

G. uliginosum, Linn.—Abundant in a swamp in the Home Park, Killarney, north of Ross bay.

Valeriana Mikanii, Syme.—The record on my authority in *Irish Topographical Botany* as "frequent" both in N. and S. Kerry must be withdrawn. The number of leaflets, and their degree of toothing, I find is not enough to separate *sambucifolia* from *Mikanii*. I have certainly seen nothing, so far, in Kerry comparable to the chalk hill form of *Mikanii* from the south of England.

Aster [lævis, Linn.]?—In great plenty in a swamp by the lake at Ross bay, Killarney. I have previously noted this plant as growing for some years near Headford, where it now seems to have died out.

Crepis paludosa, Moench.—Sparingly in Ross Island, Killarney; the second Kerry locality.

Hieracium argenteum, Fries.—I. 1. At intervals along the Slaheny river, Kilgarvan, for more than a mile, especially on and about Coolyard bridge: *M.S.* Frequent along the Sheen river, Kenmare, from near Ashgrove to above Droumagorteen bridge, especially abundant just below Dromanassig bridge; also along its tributary, the Coomeelan, for a mile or more. A welcome addition to the range of this local Hawkweed; the Twelve Bens, Galway, being the nearest station previously known.

- Hieracium orimeles**, W. R. Linton (*H. saxifragum*, Fries, var. *orimeles*, Hanb).—I. 1, 2. By the Roughty river, above Morley's bridge, 1900. Sparingly on cliffs in the Horse's Glen, Mangerton, 1889. In some abundance on rocks near the north end of the Upper Lake, Killarney, 1901, and more sparingly along the east side of the same lake, 1903. This is a puzzling Hawkweed, coming near to *H. argenteum* in general appearance, and it is satisfactory to find that both Mr. Hanbury and the Messrs. Linton agree in their identification of the Kerry specimens. Donegal is the only Irish county from which this plant has been previously recorded.
- H. sparsifolium**, Lindeb.—I. 1, 2. Sparingly about Morley's bridge, &c., Roughty river, 1899 (as *H. gothicum*, Fries), and abundant on Poulgorm bridge, and on a stony island in the River Clydagh, Upper Glenflesk, 1899-1903 (as *H. rigidum*, Hartm.). A large series of plants has enabled the Messrs. Linton and Hanbury to combine my former records of *H. gothicum* and *H. rigidum* under *H. sparsifolium*, of which the Clydagh river plant seems a form or variety. Both *H. gothicum* and *H. rigidum* must, therefore, be withdrawn as Kerry plants.
- H. vulgatum**, Fries.—This must be withdrawn for Kerry N.; Mr. Hanbury tells me that Dr. Elfstraud has definitely named my Mangerton plant *H. orimeles* as above.
- H. boreale**, Fries.—This must also go from the Kerry list for the present. A large series of this fine Hawkweed from Morley's bridge and Drohidnagower, previously recorded by me (*Cyb. Hib.*, 2nd Ed.) as *H. boreale*, having been recently sent to Messrs. Linton and Hanbury, they have decided that it is a new form, a description of which will, I hope, soon be published by the Rev. W. R. Linton.
- Leontodon hispidus**, Linn.—Very sparingly on the railway near Killarney, growing almost on the ballast, a most unsatisfactory station. This is the only time I have seen this plant in the county, although it already has two old Kerry records standing to its credit.
- Anagallis cœrulea**, Schreb.—I. 2. One plant near Mahony's Point, Lower Lake, Killarney: *M.S.* The only record I know of for Kerry.
- Centunculus minimus**, Linn.—Some new stations are: roadside south of Slaheny bridge, Kilgarvan; roadside between Dooaghs railway station and sandhills, and on damp wastes about Lough Beg; roadside near Reen, north of Killorglin: *M.S.*
- Verbascum virgatum**, Stokes.—This is, no doubt, the plant recorded by Mackay (*Mack. Rar.*) under the name *Verbascum pulverulentum*, as found "on the College grounds at West Green-lane, near Kenmare, county of Kerry, where it was observed by Mr. George Clarke in August, 1804." It is interesting to find that it still holds its ground, nearly a dozen plants being seen in 1903, a little west of Green-lane, about two or three miles east of Kenmare. "College grounds," no doubt, refers to land owned at the time by Trinity College, Dublin.

- Euphrasia Rostkoviana**, Hayne.—Slaheny valley, Kilgarvan: *M.S.*
- E. nemorosa**, H. Mart.—Grassy coast near Dooaghs sandhills, and roadside near the railway station, Kerry S.: *M.S.*
- Rhinanthus stenophyllus**, Schur.—Pastures in the Slaheny valley, Kilgarvan, and near Dooaghs (*vide* Dr. Sterneck): *M.S.* This seems the commonest form of *Rhinanthus* in Kerry.
- *Sailx pentandra**, Linn.—2. Sparingly in a damp wood near the west side of Ross Island, Killarney.
- S. ambligua**, Ehrh. (*S. repens* × *aurita*).—Damp sandy field east of Dooaghs, Castlemaine harbour: *M.S.*
- Listera cordata**, R. Br.—On the east side of the Paps mountain, above Lough Glaunafreaghaun: *M.S.*
- Ophrys apifera**, Huds.—Abundant over a limited area in the Home Park, Killarney: *M.S.* There must have been nearly a hundred plants of this orchid flowering in a space not twenty yards square—a beautiful sight. This is the second Kerry locality known to me.
- Habenaria albida**, R. Br.—Abundant on a rough headland in Rossbehy Creek.
- Sisyrinchium angustifolium**, Mill.—An extension of a previous record may be worth noting. Dr. Fogerty found the *Sisyrinchium* growing between the Middle and Lower Cloonee lakes (*Irish Nat.*, 1898, p. 227). It also grows in great abundance and luxuriance at the west end of the Lower lake, Cloonee, where I have observed it for several years past.
- Erlocaulon septangulare**, Linn.—Abundant in Lough Licka, a small lake in the mountains east of Caragh Lake, at about 600 feet, the highest I have yet seen this plant in the county.
- Carex ovals**, Good, var. **capitata**, Zonder.—Damp sand flats near Dooaghs, Castlemaine harbour: *M.S.*
- Glyceria fluitans**, R. Br., var. **triticea**, Fries.—Roadside west of Tullig, near Killorglin; *M.S.*
- G. pilcata**, Fries, var. **declinata** (Bréb.).—Roadside ditches in the Slaheny valley, and about Dooaghs, Castlemaine harbour: *M.S.*
- Festuca rubra**, Linn., var. **pruinosa**, Hackel.—Limestone rocks on Cow Island, Lower Lake, Killarney.
- Lastræa spinulosa**, Presl.—In boggy swamps in the Home Park, Killarney, north of Ross Island.

My thanks are due to the Rev. E. S. Marshall, the Messrs. Linton, and Mr. Hanbury for their kindness in looking over various doubtful plants.

Dublin.

BATS, HEDGEHOGS, AND FROGS IN WINTER

BY C. B. MOFFAT, B.A.

THE flight of Bats in the winter months is frequently reported as an exceptional occurrence. The accompanying table of observations, kept at Ballyhyland in the winter of 1901-2, may, I think, help to show that it is more or less reducible to rule.

The record begins on October 26th, and relates not only to Bats, but also to Hedgehogs and Frogs. I made it my practice during each evening of the winter, until the end of February, to visit after sunset a series of spots which I knew to be beats of these animals, and to note whether or not they were seen stirring. From the table annexed to this paper it will be seen that Bats (practically these were all *Pipistrelles*) were observed on nineteen evenings in November, nine evenings in December, ten evenings in January, and five evenings in February; Hedgehogs were observed on fifteen nights (they are later in coming out than the Bats) in November, nine nights in December, four nights in January, and not at all during February; while Frogs were observed on only two nights in November, and not at all in December, but showed themselves (on land) during three nights in January, prior to the 25th of that month, when spawning began. During February, when the Hedgehogs and Bats were least in evidence, the Frogs, now at their spawning grounds, attained their maximum activity.

Whatever interest attaches to these facts would be thrown away unless attention were paid to the question of temperature. In the right-hand column of my table I have, therefore, recorded for each evening the point at which the thermometer stood, *half-an-hour after sunset*, at an elevation of about four feet from the ground.

In the other columns are noted for each evening the respective numbers (if less than six) of Bats, Hedgehogs, and Frogs observed. If six or more were seen the letter N (numerous) is used; and NN signifies "very numerous."

The result as to Bats is clear. It is that at all times during the winter, provided the temperature of the hour of dusk is above 43° Fahrenheit, some Bats of the common species are

pretty sure to be found flying if looked for in suitable localities. Below 43° their emergence is not to be calculated on, but it sometimes takes place at lower temperatures, down to 39° . It will be noticed that a return of mild weather brings out the Bats immediately, no matter how frosty the previous nights and days may have been. The reason why so few Bats were seen during February was that the whole of that month—until the last week, when they re-appeared—was continuously cold.

The conclusions as to the Hedgehog, however, are strangely in contrast with those as to the Common Bat. There is no evidence that *warmth* has any effect in waking up the Hedgehog; but it is most remarkable how often this animal showed itself on *cold frosty nights*, not only during the severe spell of November 14th to 16th, when some people might suspect that it had not yet begun to hibernate, but again during the sharp frosts of the latter half of December and of the middle and end of January. It was almost invariably on cold nights that I met the Hedgehog; the temperature recorded in the table shows this, but it must be further borne in mind that it would nearly always be several degrees colder on the grass, especially at the late hours at which I used chiefly to meet this eccentric creature going its rounds. Only twice during December, and never in January, were Hedgehogs and Bats seen on the same night, though there were during those two months nineteen nights on which Bats were observed, and thirteen on which Hedgehogs were noticed. A further curious fact is that when at last both the Hedgehogs and the Bats retired, the activity of the Frogs really began.

As a matter of fact the *hibernation* of the Frog seems to be more analogous to that of the Bats than to that of the Hedgehog, for it is clear that warmth is a principal cause of its interruption. At any temperature above 46° one may meet Frogs moving—as is shown by their emergence at temperatures of 46° and $46\frac{1}{2}^{\circ}$ respectively, on the nights of November 18th, 1901, and January 2nd, 1902. On cold nights, until spawning has begun, one never encounters *Rana temporaria* on the move; indeed, that animal needs a higher temperature than the Pipistrelle, and at least as high a one as the Long-eared Bat, to induce it to move from its winter retreat. But

whereas with the Bats this sensitiveness to cold is chronic, with the Frog it seems to be merely seasonal. Once the awakened Frog has reached its spawning grounds, a return of cold weather by no means sends it back to slumber. It will be seen from my table that, from January 25th onwards, fresh spawn was being constantly deposited, notwithstanding a long succession of cold and often frosty nights. Even during the period of the Frog's maximum activity (the nights of February 17th to 21st), the temperature remained almost too low for the Pipistrelle to fly, being $42\frac{1}{2}^{\circ}$ on the warmest, and $36\frac{1}{2}^{\circ}$ on the coldest evening of the series. Yet the activity and clamour of the spawning Frogs, in some at least of the pools under notice, was far greater at night than during the comparative warmth of the daytime.

The spawning of the Frog therefore (if my conclusions are right), requires to be *preceded* by some warm nights, during which the creatures can travel under cover of darkness to their spawning pools, and these are often a good half-mile or more from their sleeping places. But it does not need to be *conducted* on warm nights, and can be carried on successfully at least ten degrees below the temperature at which the hibernating Frog awakes from sleep.

In explanation of the small number of Frogs observed before the commencement of the spawning season, I must point out that Frogs, when they do come abroad during winter, are much more likely to escape detection than either Bats or Hedgehogs. They are more nocturnal than the Bats—that is to say, they wait until a later period of the evening to come out—and so cannot, like those creatures, be discovered by the unaided eye. The Hedgehog is also, as compared with the Pipistrelle, a late riser—on November 10th, 1901, I timed three Hedgehogs emerging from their sleeping-place, who came out respectively 58, 88, and 98 minutes after sunset—but the Hedgehog proclaims his whereabouts to the ear, as he moves along with rustling steps and hungry sniffs. The Frog, on the contrary, travels almost noiselessly through the grass, and only betrays his presence when startled by the too close approach of a supposed enemy. Then the crawling pace is exchanged for that succession of hasty jumps by which everyone knows *Rana temporaria*; but to find the Frog

in this fashion one has almost to tread on him first. And this, I think, explains why there are many warm nights in my table on which no Frogs were noted, though very few (and of these few nearly all were wet or windy) on which there were no Bats.

As I have not learnt to distinguish the Whiskered Bat (*Vespertilio mystacinus*) from the Pipistrelle or Common Bat (*Vesperugo pipistrellus*) on the wing, it is possible that a few individuals of the former species, which occurs at Ballyhyland (see *Irish Naturalist*, vol. xi., p. 103), have been noted in my table as Pipistrelles; but this would not affect the general result. On January 21st, 1902, I examined, as already recorded, a Whiskered Bat caught flying at a temperature of 48° , and the Long-eared Bat often flies (but generally evades observation) at 46° . Most of the Bats seen at low temperatures can, however, be none other than the Pipistrelle, and I saw an example of this species captured at $43\frac{1}{2}^{\circ}$ on the evening of December 28th, 1901. The Hairy-armed Bat (*Vesperugo leislerei*), whose haunts were often visited on warm evenings, was not seen by me at all during the period of these observations; and it may be concluded that this remarkably somnolent animal, which even in its season of activity sleeps for $21\frac{1}{2}$ hours in the 24, is little addicted to winter flight.

TABLE.

A record of the Bats, Hedgehogs, and Frogs observed between October 26th, 1901, and February 28th, 1902, with a note of the temperature of each evening, read half an hour after sunset.

The letter N. (signifying "numerous") is used where at least six individuals of a species were seen. NN. is used to signify "very numerous."

Date.		Bat.	Hedgehog.	Frog.	Temperature, Fahrenheit Degrees.
October	26,	N.	2	—	46
	27,	NN.	3	N.	52
	28,	NN.	2	N.	53
	29,	[No observations.]			52
	30,	N.	1	—	47
	31,	N.	—	—	46

Date.	Bat.	Hedge hog.	Frog.	Temperature, Fahrenheit Degrees.
November 1,	N.	4	—	45
2,	NN.	—	N.	50
3,	N.	1	—	50
4,	N.	2	—	46½
5,	I	1	—	43½
6,	—	2	—	41
7,	I	3	—	43
8,	5	2	—	42½
9,	NN.	4	—	46
10,	N.	3	—	49
11,	[No observations.]			49
12,	—	—	—	41½
13,	—	—	—	38
14,	—	1	—	34½
15,	—	2	—	34
16,	—	2	—	33½
17,	I	—	—	39½
18,	5	—	Ia	43½
19,	N.	2	—	49
20,	N.	—	—	49½
21,	N.	1	—	48
22,	2	—	—	43
23,	I	—	—	39
24,	—	—	—	41
25,	N.	2	—	42½
26,	—	—	—	44½
27,	—	—	—	41½
28,	—	—	—	43
29,	2	—	—	42
30,	2	—	—	43½
December 1,	N.	—	—	45
2,	N.	—	—	47
3,	3	—	—	46
4,	I	I	—	44
5,	—	—	—	41½
6,	N.	—	—	46½
7,	N.	—	—	49
8,	—	—	—	42½
9,	—	—	—	37
10,	—	—	—	38
11,	—	—	—	36
12,	—	—	—	34
13,	—	—	—	36½
14,	—	—	—	36
15,	—	—	—	34
16,	—	—	—	39½
17,	—	—	—	39
18,	—	—	—	36½
19,	—	—	—	36½

a. Frog at 8.30 p.m., when temperature had risen to 46°.

Date.	Bat.	Hedgehog.	Frog.	Temperature, Fahrenheit Degrees.
December 20,	—	—	—	34
21,	—	—	—	34½
22,	—	1	—	37½
23,	—	1	—	38
24,	—	2	—	36½
25,	—	1 ^b	—	39
26,	—	1	—	36½
27,	—	1	—	33½
28,	3	2	—	43½
29,	—	2	—	40
30,	1	—	—	47½
31,	N.	—	—	45½
January 1,	—	—	—	46
2,	1	—	1	44½
3,	4	—	—	48
4,	—	—	—	41
5,	—	—	—	43½
6,	—	—	—	45
7,	—	1	—	43
8,	1	—	—	44
9,	3	—	—	47½
10,	1	—	—	49
11,	—	—	—	41
12,	[No observations.]			46
13,	—	—	—	36
14,	—	1	—	34
15,	—	—	—	39½
16,	—	—	—	39½
17,	—	1	—	38
18,	—	—	—	39½
19,	2	—	—	44
20,	N.	—	—	47
21,	3	—	1 ^d	48
22,	5	—	1 ^e	48
23,	3	—	—	44½
24,	—	—	—	34
25,	—	—	Ova,	35
26,	—	—	—	36
27,	—	—	New ova,	40
28,	—	1	New ova,	36
29,	—	—	—	36½
30,	—	—	—	33
31,	—	—	—	36
February 1,	—	—	New ova,	38
2,	—	—	New ova,	38

b. Hedgehog caught in rabbit-trap during night.

c. Frog at 10 p.m., temperature 46½.

d. Frog at 8 p.m., temperature 48.

e. Frog at 9 p.m., temperature 47½.

Date.	Bat.	Hedgehog.	Frog.	Temperature, Fahrenheit Degrees.
February 3,	-	-	-	37 $\frac{1}{2}$
4,	-	-	New ova,	36 $\frac{1}{2}$
5,	-	-	-	34
6,	-	-	New ova,	34 $\frac{1}{2}$
7,	-	-	New ova,	36
8,	-	-	-	34 $\frac{1}{2}$
9,	-	-	New ova,	31
10,	-	-	-	32 $\frac{1}{2}$
11,	-	-	New ova,	31 $\frac{1}{2}$
12,	-	-	-	30 $\frac{1}{2}$
13,	-	-	-	32
14,	-	-	-	35
15,	-	-	-	37 $\frac{1}{2}$
16,	-	-	-	39
17,	I	-	N.N. (spawning)	40
18,	-	-	N.N. (")	40
19,	-	-	N.N. (")	37
20,	-	-	N.N. (")	36 $\frac{1}{2}$
21,	I	-	N.N. (")	42 $\frac{1}{2}$
22,	No observations on these nights, except that Bats were out in some numbers on the 23rd and 25th, and were not seen (though looked for) on the 26th.			44
23,				48
24,				47 $\frac{1}{2}$
25,				45 $\frac{1}{2}$
26,				43
27,	N.	-	-	45
28,				46

Ballyhyland, Co. Wexford.

THE FORMATION OF IRON ORE IN LOUGH NEAGH.

BY GEORGE C. GOUGH, A.R.C.SC., F.G.S.

My attention was drawn some time ago to the iron ore of Lough Neagh by Mr. Welch, who presented to Queen's College, Belfast, a sample dredged from Lough Neagh in 1900, and which was the subject of a note by him in the *Irish Naturalist* for July, 1901. Soon after, Mr. Pearson, of the Larne Marine Station, brought me a specimen which he had dredged in the same lough, of what the fishermen there call "cinders," and which are found in considerable quantities in certain parts. These "cinders" are irregular in shape and size, and are dark brown or black in colour, with a more or less scoriaceous appearance. Their outer layer, which gives them this appearance, can be flaked or broken off fairly easily, and

its uneven fractured surface often shows a black resinous lustre. The specific gravity of this layer, as taken by a Walker's balance, was 2.50, the specific gravity of the "cinder" being 2.67. On being sectioned and examined, it was found to be a typical basalt in a fairly fresh condition, the felspars and olivine being only slightly altered, covered by a crust of iron oxide. Nevertheless there is an abundance of small groups of rhombic zeolites, and the magnetite has been hydrated and changed to limonite.

The crust, being the more interesting part, I examined chemically, and found it to contain iron oxide, manganese, magnesium, calcium, carbonic acid, phosphoric acid, and water, which are the usual constituents of bog iron ore.

Another portion was taken with a view to the estimation of the iron present. After being crushed, when it had the appearance of cocoa, it was dried at 100° C., weighed, and then treated with warm hydrochloric acid for some time, until all the iron was dissolved. The insoluble residue, consisting mainly of silica, was carefully washed, and the washings added to the dissolved iron and made up to 500 c.c. with distilled water. The ferric chloride was then reduced to the ferrous state with stannous chloride and titrated with a standard solution of potassium permanganate. Several determinations were made, the result being that I found the percentage of iron present to be 38.89. The insoluble residue was dried at 100° C. and weighed, the percentage being 18.90.

If the iron be calculated as limonite ($2\text{Fe}_2\text{O}_3, 3\text{H}_2\text{O}$) the percentage is 64.93, which with the insoluble matter brings the total to 83.83 per cent. The rest is made up of manganese and phosphoric acid, of which there is a fair amount, and much smaller quantities of calcium and magnesium carbonates.

When Mr. Welch's ore was examined, I found it to be very variable. It consists of small, rounded masses, some spheroidal with concentric structure, others flattened and disc-like. Some, however, on being broken open, showed that they were small rounded and sub-angular pieces of basalt, with an exceedingly thin layer of ore on the outside which gave them the same appearance as the rest of the masses. All apparently have a nucleus of basalt¹, and specimens can be found show-

¹ One specimen seemed to the naked eye to have as nucleus a tiny fragment of mica schist.

ing the gradation from such as I have just described to those where the nucleus can only be detected by grinding down a section and examining it under the microscope.

Selecting some of those which appeared to consist chiefly of ore, I found the specific gravity, taken with a Joly's balance, to be 2.53. These were crushed, dried at 100° C., weighed and treated as previous specimen, the percentage of iron being 36.93. Calculated as limonite, the percentage is 61.66, the percentage of the insoluble residue being 36.51, giving a total of 98.17 per cent. The remainder consists apparently of a small quantity of magnesium carbonate; no manganese, phosphoric acid, or calcium being found. The CO₂ in the specimens seems to vary greatly, some giving little or no effervescence with acid, others a fair amount, but none very much.

From my examination, it appears to me that the ore is being formed chiefly from the decomposition of the magnetite in the basalt in and around the lough. As suggested by Prof. Cole, in a note attached to Mr. Welch's letter, I have examined the gelatinous residue remaining after solution of the iron in dilute HCl, but have found no trace of cellular structure either in the form of Algæ or Diatomaceæ. I believe that the altered iron in the fragments of basalt acts as a segregation centre on which the limonite is deposited from the iron in solution in the lough, on the smaller particles, with a concentric structure. In the section of the "cinder" there seems to be continuity between the iron in the basalt and the ore incrusting it. Whether the Tertiary iron ores were formed in the same way I cannot say, but I intend to section some specimens of pisolitic ore in the hope of finding a similar nucleus of basalt.

In conclusion, it is interesting to note that the pisolitic ore now forming is practically pure limonite, while that incrusting the "cinders" is an impure variety having the usual composition of the bog ores.

Queen's College, Belfast.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Silver Pheasant from Lady Constance Butler, small Birds from Mr. W. W. Despard and Miss K. Barlow, and a Woodcock from Mr. R. M. Barrington. A Golden Agouti has been born in the Gardens. The new young Elephant, "Padmahati," is now being trained, and it is hoped that she will soon be able to carry visitors to the Gardens for short rides.

BELFAST NATURALISTS' FIELD CLUB.

FEBRUARY 16.—Prof. GREGG WILSON in the chair. R. Lloyd PRAEGER read a paper on "Plant Associations, with special reference to the Flora of Ireland." After referring to the vegetation of the world as a whole, he dealt with the general conditions of life, and discussed the various ecological factors and their influence. The special characters developed by plants in response to peculiarities of environment were next described. Plant associations were then discussed, and an account given of a recent survey of the Dublin district by Dr. Pethybridge and the speaker. A strong appeal was made to the members to start this branch of botanical research. The paper was illustrated by lantern slides, maps, and books. Rev. C. H. Waddell and R. Welch discussed the paper.

MARCH 15.—The President, W. J. FENNEL, M.R.I.A., in the chair. There was a large attendance. Previous to the meeting the "science gossip half hour" was held in the new clubroom, when there was an exhibit of British freshwater shells of the genus *Planorbis* exhibited by the conchological members, a special feature being a large locality-series of those very troublesome species, *P. carinatus* and *P. marginatus*, sent over by members of the Conchological Society in Lancashire to assist in determining Irish examples, the difficulty being that many Irish specimens, especially those in the north-east, seem to be intermediate forms. The English shells were found equally puzzling, and judging by the names attached to a number of the shells, English conchologists are as undecided on this question as their Irish brethren. The general conclusion arrived at was that really typical *P. carinatus* of the text-books is excessively local in Ireland, and evidently rare in England. The B.N.F.C. collectors are lending their series to the Conchological Society at an early date, as it is proposed to have a meeting on this special subject. The President having taken the chair, an illuminated address was presented to the Treasurer (W. H. Phillips), on the occasion of his golden wedding. With a few years' interval Mr. Phillips has been Treasurer of the Club since 1864.

R. WELCH read a short note on *Helicella zakkarensis*, a rare land shell, which Arthur W. Stelfox, a member, found feeding on the roadside about a mile inland from Rostrevor. This mollusc lives in the Kabylie district of Algiers, and how a specimen came to be found alive in County Down is a mystery. The shell was named only after great difficulty, full-grown specimens being found in the well-known Norman Collection in the British Museum. It was this same observer who found a Pyreneen shell alive at Belmont, Belfast, feeding on the roadside, some years ago.

GEORGE C. GOUGH, A.R.C.S., F.G.S., read a paper on "Geology and Scenery." The paper was illustrated by a fine series of lantern slides.

WM. GRAY, M.R.I.A., read a paper on "The Club's Influence in Promoting the Advancement of Science."

Five new members were elected.

FEBRUARY 27.—BOTANICAL SECTION.—Rev. C. H. WADDELL, B.D., delivered the third and last of a series of lectures on the *Umbelliferae*. Before the lecture, the following resolution, moved by Mr. Waddell, and seconded by Wm. Porter, was passed with much enthusiasm, viz. :—"That the members of the Botanical Section of the B.N.F.C. desire to express their great gratification at the honour recently conferred on Mr. S. A. Stewart by the Linnean Society in electing him an Associate of that body; and they respectfully tender him their cordial congratulations on the occasion."

MARCH 11.—GEOLOGICAL SECTION.—A party of twenty assembled at Castle Junction and proceeded under the guidance of Messrs. Bell and Orr to Whiterock quarries, where some time was spent looking for fossils. The section exposed is in the sides of a mountain ravine cut deeply through the Chalk, Yellow Sands, and the underlying Greensand beds. Heavy rainfalls, such as that of September, 1902, have scoured a deep channel through the talus which has formed in the long disused quarry, and have left a very characteristic fan-talus on the lower ground. The exposure here is of the characteristic Antrim rocks, Upper Greensand and Upper Chalk overlain by sheets of basalt. Details of the section are well given in Dr. Hume's "Cretaceous Rocks of Antrim," *Q.J.G.S.*, vol. liii., p. 587. The Greensand and Chalk are very fossiliferous, and the search of the members was rewarded by their finding many specimens of sea-urchins, shells, fish teeth, sponges, &c. G. C. Gough, F.G.S., gave a short explanation of the origin of the flint, which occurs here in tabular masses as well as in nodules through the Chalk. A visit was paid to the Ballymurphy brickworks, Springfield Road, where the Keuper Marls are extensively worked for brickmaking. The marls are here intersected by parallel basaltic dykes which now stand up like high walls. These have baked the clay for a short distance on either side, making it quite hard and brittle. The stratified marls are overlain by unstratified Boulder clay to a depth of several feet, and from this deposit marine shells have been procured by some of the members.

DUBLIN NATURALISTS' FIELD CLUB.

MARCH 5.—Geological Excursion to St. Dolough's.—Twenty-one members and visitors were present. The party left Amiens-street by the 1.45 train. From Portmarnock the members walked through St. Dolough's Park to the quarries behind the church. Here Mr. Duffy explained the geological features of the ground, and discussed the question as to the age of the limestone, which is usually given as Lower Carboniferous. The party then proceeded round the quarry, extracting such fossils as could be reached. This resulted in a very typical collection of the fossils for which this quarry is noted. An interesting feature of the day was the examination of a glaciated land surface which had been laid bare by the removal of the overlying Boulder-clay. The approaching darkness prevented further work being done, and after having taken tea with Mrs. Hone at St. Dolough's Park, the party returned to town. Very severe snow showers fell frequently during the afternoon.

MARCH 8.—Fourth winter business meeting was held in the Royal Irish Academy—the Vice-President (C. B. MOFFAT) in the chair, G. H. CARPENTER, B.Sc., lectured upon "Some Problems of the Irish Fauna," calling attention to the existence in Ireland, and to a less degree in Western Britain, of South-western ("Lusitanian"), North American, and Arctic faunistic groups, in addition to the common widespread Britannic species of animals. The South-western group must be regarded as undoubtedly older than the Arctic, on account of the restricted and discontinuous range of its members; this portion of our fauna, at least, must be regarded as pre-glacial. It appears to show the presence in Miocene times of a continent, including Ireland and the Atlantic isles. Probably the south British animals represented in the west of Ireland are also pre-glacial. Reference was made to Dr. Scharff's explanations of the absence from Ireland of the distinctively Eastern fauna, and the periods at which he believes the various sections to have entered our area. The lecture was illustrated by lantern slides.

W. B. WRIGHT, B.A., considered that the glaciation of the present Irish land-area—now proved to have extended to the extreme south coast—would render impossible any survival of a pre-glacial fauna, except perhaps on tracts to the south and west now submerged.

F. O'B. ELLISON, B.A., objected to the extreme glacial theories of Mr. Wright, and spoke strongly against the "continental" theory of the origin of the Atlantic isles.

P. DUFFY read an account of the excursion held on Saturday, March 8th. Miss M'Ardle was elected an associate member.

NOTES.

ZOOLOGY.

New Irish Copepods.

During February, whilst examining the branchial sacs of several simple ascidians for parasitic Crustacea, I found a single female specimen of the Copepod *Botachus cylindratus*, Thorell, and also several specimens of *Notopterophorus papilio*, Hesse, besides several of the commoner species. These are both new Irish species, although there is little doubt that the latter is by no means rare.

I also obtained *Dactylopus brevicornis*. Claus, in the bottom tow-net in Larne Lough. So far as I can ascertain, this has not been recorded before from Irish waters.

JOSEPH PEARSON.

Marine Laboratory, Larne Harbour.

Water Beetles in Co. Down.

Mr. W. H. Patterson, M.R.I.A., has sent me some water beetles taken by him in a quarry on a hill near Gilnahirk, south of the Knock. The beetles were captured in November, a month in which none but a most ardent collector would venture forth with the water-net; results, however, show that such a venture is rewarded. The most interesting among the beetles sent is *Hydroporus dorsalis*, F., for this is but the second record of its capture in Ireland; the first will be found in the "List of the Beetles in Ireland," p. 821, where it is recorded as captured in the Lagan Canal, near Moira, by Mr. Buckle. This is another species of northern origin added to our fauna, ranging to Finland and Siberia—in former as far north as 68° 10' (*vide* Sharp's *Dytiscideæ*, p. 481, *Trans. R.D.S.*, 1882). Mr. Patterson only obtained one specimen, but where there is one there are likely to be more. Besides this, he took *Rhantus notatus*, Berg., which has not been previously met with in Co. Down; also *Agabus unguicularis*, Thoms., *A. nebulosus*, Forst., and *Gyrinus minutus*, F.; *Hydroporus lineatus*, F., was quite plentiful, and *H. planus*, F., and *H. memnonius*, Nic., were also met with.

W. F. JOHNSON.

Poyntzpass, Co. Armagh.

Is the Frog a Native of Ireland?

As the recent discovery of bones of the Common Frog in the cave deposits of Kesh Corran, Sligo (*Trans. R.I.A.*, xxxii, Sec. B., p. 183), has once more drawn attention to this question, so vigorously discussed in vols. II. and VI. of this Journal (1893 and 1897), the following quotation may be of interest. Though by no means from a recondite

source—it occurs on p. 315 of Dubordieu's *Statistical Survey of the County of Down*, published in 1802—the passage appears to have escaped notice in the course of the discussion. It has not, at least, been referred to or quoted in these pages so far as I can discover.

“The introduction of frogs into this country, from which they have spread in such numbers through the rest of the kingdom, though in itself a subject of no importance, must form a curious and interesting object in the eyes of a naturalist. That they are not indigenous, and that they first made their appearance near Moira, in the western parts of this county, can be proved beyond contradiction, but by whom they were first imported is not so certain. I was assured by an old gentleman of the greatest veracity, who died some years ago above the age of eighty, that the first frogs he ever saw were in a well near the above-mentioned town, from whence he brought some of them to Warings-town, where, until that time, they had never been seen; the quickness with which they multiplied, and the rapidity with which they spread are surprising, especially the latter, in a creature not very well adapted, at least in appearance, either to move with celerity or with perseverance; and there are many stories still current of the terror and surprise excited by the view of this disgusting though innocent animal, which seems formed to be the prey of every voracious creature either by land or water within whose reach it comes.”

It may be that the deliverance of the Kesh Corran cave deposits on this question is so weighty, as to justify the assertion, *causa finita est*. On the other hand, it may perhaps be still permissible to keep an open mind in the matter, and should that be so, the passage just quoted may be taken as affording some evidence of the rapidity with which that “disgusting though innocent animal,” the Common Frog, effected its very thorough settlement in Ireland.

NATHANIEL COLGAN.

Sandycove, Co. Dublin.

Birds of the Isle of Man.

Having undertaken a work on this subject, which will shortly be published, I would gratefully receive, and duly acknowledge, any notes contributed by readers of this Journal. Information is particularly desired with regard to the following species:—Whinchat, Garden Warbler, Lesser Whitethroat, Wood Warbler, Dipper, Twite, Merlin, Rock Dove, the species of Grey Geese and sea-frequenting Ducks.

P. S. RALFE.

Castletown, Isle of Man.

Snow Goose in Longford and Mayo.

In the *Zoologist* for December Messrs. Williams and Son, of Dublin, record two specimens of the Snow Goose (*Chen hyperboreus*) shot in Co. Longford on October 28th, while in the January issue of the same magazine Mr. R. Warren records this bird both in Co. Longford and in Co. Mayo.

Hérons in Belfast Lough.

Some correspondence about Herons that lately appeared under "Nature Notes" in the *Northern Whig* induced me to communicate to that Journal my views as to the causes that have led to the greatly reduced numbers of the birds frequenting the bay now as compared with former years, and that communication I have now been asked to repeat, in a slightly extended form, for the *Irish Naturalist*.

Thompson (vol. ii., p. 135) records fifty seen at a time on the Co. Antrim side of the bay, within three miles of Belfast, on 11th November, 1840; and on another occasion (p. 133) he reckoned sixty. On 14th November, 1847 (p. 134), he counted forty-two, awaiting the falling of the tide, in a large ploughed field at Parkmount, the seat of H. H. M'Neile, Esq., near Belfast. It is strange that, while mentioning other heronries in the neighbourhood, Thompson does not mention the one at Parkmount, although, as we have seen, he was aware of Herons frequenting the place; yet from what Mr. M'Neile told me twenty-five years ago, the Herons must have commenced nesting there some twenty years prior to the date last mentioned, namely, about 1827. So recently as in 1878 I have recorded seeing twenty-nine in one afternoon, while now sometimes for weeks I do not see one. I did see one this week, and a few are still to be seen most days on the Co. Antrim side. I attribute the beginning of this falling off to the restriction of the birds' feeding grounds by the railway and other embankments on both sides at the upper extremity of the bay; but for the Herons' more recent and almost total disappearance from the upper reaches one must look for other reasons. The "new cut," as it used to be called, and other harbour improvements, culminating in the Victoria Channel, diverted the former flow of the tide and the river from the old tortuous channels; and, by making an increased "scour," gradually swept the mud or ooze off the banks, and with it the Ribbon or Grass Wrack (*Zostera marina*) that grew on it. This *Zostera* was the haunt of multitudes of eels, which formed the principal food of the Herons; so now that the mud, and with it the *Zostera*, and following it the eels, have all gone, the Herons have gone too, an interesting and curious chain of circumstances. The eels have, to a large extent, given place to other fish, and the Herons have been succeeded by a greatly increased number of Cormorants and Red-breasted Mergansers, both of which species obtain their food by diving. We have Thompson's record of the forty-two Herons seen at one time at Parkmount in 1847. On 22nd March, 1879, I saw twenty-one there in a group, and at the same time there were about twenty-three to twenty-five nests in the place; while latterly, as Mr. M'Neile kindly informs me, under date 6th February, 1904, twelve is the maximum number seen, barely one-fourth of the numbers there twenty-five years ago. Within the last eight or ten years, Mr. Wilson tells me, the Herons have ceased nesting at Belvoir Park; but the birds still frequent a lake in the grounds, and also the river Lagan, which bounds one side of the demesne. The birds may often be seen on the stretch of

foreshore between Carrickfergus to below Kilroot Point, while Larne Lough still has a numerous colony, natural conditions not having been much interfered with there.¹ I believe there is a small herony at Redhall.

The increased numbers in which the Red-breasted Merganser visits the Bay now is remarkable. I remember when the bird was quite rare here; while a couple or three winters ago a flock of not fewer than four hundred—probably more—remained about three-quarters of a mile to a mile off Holywood for several weeks; and I see the birds in small companies—up to eight or ten—every day that I am on the shore now.

Cormorants, too, after having become much scarcer than they were early in the last century, have become more numerous again within the last twenty years or so. When my book on the birds of the lough was published in 1880, the largest number of Cormorants recorded as having been seen by myself on any one occasion was seventeen; that was on the 25th February, 1873. On 3rd February, 1894, walking down from Belfast to Holywood, near Tillysburn station, I saw within five minutes no fewer than fifty-five, all flying inland from Belfast Lough over the hills, apparently going to Strangford. On 29th September, same year, I saw thirty-five in one flight near the same place, and going in the same direction. These birds are very destructive to fish. I understand one shilling for each bird killed is now paid for their destruction on a certain important salmon river in the North of Ireland. Four pence each used to be the fee at Horn Head. In the assize records of the Co. Antrim for the year 1729, mention is made of a person in Island Magee who had killed ninety-six Cormorants in one season.

I suppose the numerous Cormorants that frequent the Co. Down shores from Greypoint down to the entrance to the lough, find night resting-places on their own shores, and probably in the Copeland Islands; but most of the rest of our local birds of this species seem to roost at night at the Gobbins. From Whitehead, on 31st August, 1902, I counted sixty-five flying down between 6 and 6.18 p.m.; and on 7th September no fewer than eighty flew down between 6 and 6.5 p.m.—thirty in one flight.

Lady Dufferin wrote me from Clondeboye, on 11th March, 1897, that eleven were seen at one time on the lake there a day or two previously. Some few Cormorants, probably non-breeding birds, now stay here all summer. I have seen them on the lough in June.

R. LLOYD PATTERSON.

Holywood, Co. Down.

Little Crake in Co. Kildare.

The second Irish-taken specimen of the Little Crake (*Forzaria parva*) is recorded by Messrs. Williams in the *Zoologist* of December last (ser. 4, vol. vii., p. 460). It was shot at Rathangan, Co. Kildare, on November 12th. An interval of nearly fifty years has elapsed since the previous record of this rare bird.

¹ On 9th September, 1888, thirty-six Herons were seen together on Swan Island, Larne Lough, and they have greatly increased since.—EDS.

Siskin breeding in Co. Wicklow.

The Siskin is by no means a rare breeder in this county. To my certain knowledge it breeds at Glendalough, Lough Dan, Luggela, in the vicinity of Laragh, and I believe it to breed in many other parts of the Co. Wicklow, but have no proof as yet. In the month of May, 1901, I found in one day three nests at Glendalough—two of them had three eggs in each—the third, on which the bird was sitting, I did not climb to, as the branch was so slender I was afraid to venture down it, knowing the risk of upsetting the contents. The height of the Siskin's nest from the ground seems to vary. I have found them very high up (both at the end of a branch and against the main stem of a tree), and also very low down. One nest, near Laragh, was not eight feet from the ground; another in the same locality was about twelve feet. The birds are very tame during the breeding season, and when on the nest will let you almost put your hand on them before they will stir. Last year I found a nest with six eggs, on which the bird was sitting so tightly that I had to remove her with a piece of stick. The nests are easily found if one watches the birds, as they appear to take no precaution to put you off the track, as some of the other species do, but, on the contrary, they will lead you direct to their tidy little abode. One nest to which I climbed, while sitting on the branch admiring the structure, with its mistress sitting tightly thereon, the male bird came and perched on an adjoining bough, and sang the sweetest song I have ever heard. There is no doubt as to the thieving propensities (mentioned by Rev. Wm. W. Flemyng, *I.N.*, February, 1904) of the Siskin when building its nest, as I have watched it on more than one occasion taking moss from the nest of a Chaffinch, and once from the nest of one of its own species.

CHARLES BLAKE KNOX.

8 Milward Terrace, Bray.

Winter Visitors.

The following rare specimens have been received by us for preservation during the past few months, and the appearance of so many arctic visitors betokens severe weather in the north.

On the 16th September we received an adult Brent Goose (*Anser bernicla*) which was shot at Buttevant, an inland locality, by the Rev. F. Coughlan. This early appearance is worth noting.

An adult male Long-tailed Duck (*Anas glacialis*) was sent us from Kilkee on 27th October, and on the 6th November an Eider Duck (*Somateria mollissima*), which was shot at the Old Head of Kinsale by Mr. J. O'Sullivan.

During the latter part of October and first week in November we received about nine Short-eared Owls (*Asio accipitrinus*) from different parts of the Co. Cork, this being the largest number of this bird we ever obtained within the space of a week.

We have received two specimens of a southern visitor, the Glossy Ibis (*Plegadis falcinellus*), one from Rev. F. Coughlan at Buttevant and the other from Dr. Hutch, Conna, which was sent on October 1st. The latter bird, which has the head and neck speckled, has much longer legs than the former.

On the 16th December we received what in all probability was a specimen of the Red-necked Grebe (*Podiceps griseigena*) which was obtained at East-ferry; the head and neck of this specimen was so badly injured by dogs as to render identification almost impossible. We have, however, hopes of proving same beyond doubt. At present we cannot state definitely. On the 4th January a Spotted Crake (*Porzana maruettii*) reached us from Buttevant.

F. R. ROHU & SON.

Cork.

Were the Irish Elk and the Reindeer contemporaneous in Ireland?

The late Professor Leith Adams ("On the recent and extinct Irish Mammals," *Scient. Proc. Royal Dublin Society*, vol. ii., 1880, p. 78), asserted that the Reindeer and the Irish Elk had lived contemporaneously in Ireland in former times.

Mr. W. Williams ("On an attempt to elucidate the history of *Cervus Megaceros*, commonly called the Irish Elk," *Scient. Proc. Royal Dublin Society*, vol. ii., 1880, p. 110), however, has since shown that in the case of the Ballybetagh Bog at any rate, the antlers of these two species of deer were not found on the same level (p. 110).

He pointed out that both Reindeer and Irish Elk remains occurred in the deposit underlying the peat, but that those of the former animal were discovered in the upper clay, and the remains of the Irish Elk in the stratified lake sediment beneath the clay. Mr. Williams concluded that the lower deposit must have been laid down during a temperate climate, while arctic conditions prevailed when the Reindeer lived in Ireland.

Without wishing here to discuss the soundness of Mr. Williams' conclusions, I should like to draw attention to a second apparently contemporaneous occurrence of Irish Elk and Reindeer remains near Mullingar, in the County Westmeath.

Mr. Cleary, a veterinary surgeon at Mullingar, had a drain cut on his property in the townland of Kilpatrick, about two miles from Mullingar. During the operation he discovered a number of bones which he offered to the National Museum in Dublin.

I was unable at the time to inspect the site, but James Duffy—a museum attendant, who has shown particular interest in fossils, and whose judgment and power of observation can be relied upon—was sent to fetch the bones and report on the circumstances of their discovery. He brought back a fine head with incomplete antlers of the Irish Elk,

and also the posterior portion of the skull of a Reindeer with the antlers still attached, and he informed me that these remains were found about fifteen feet apart, but on the same level five feet below the surface of the soil in white marl, and that there was sand under the marl, but neither sand nor turf above it. He thought that there was probably peat above the marl formerly, and that it had been entirely cut away for fuel.

I should be glad to hear from any reader of the *Irish Naturalist* of any discovery in the country of Reindeer remains, and of the circumstances of their occurrence, as it would be of great interest to ascertain whether this northern species lived together with the Irish Elk in Ireland, which deer, we have reason to believe, came to us from the south.

R. F. SCHARFF

National Museum, Dublin.

BOTANY.

Glyceria festucæformis in Ireland.

The reply of Mr. Praeger to my remarks on the possibility of *Glyceria festucæformis* being an alien in County Down, does not embrace all that should be said. To get at the truth in a question of natural history like this, both sides should be duly stated and weighed. Mr. Praeger is an able advocate, but he is a special pleader. For there is an omission in his reply which reduces the force of his elaborate arguments.

Though I know Strangford Lough, the Ards, the Quoil, and Comber for more than fifty years, and think I might be able to show Mr. Praeger something about their plants and casuals which he does not know, I acknowledge that I got the idea of the possibility of the seed of this grass being introduced with grain in a foreign ship from Mr. Praeger himself! His words, in his original account of his discovery in the Ards, are:—"That the plant is indigenous there can be no shadow of doubt. In the whole of Strangford Lough there is no port where foreign vessels call." This surely implies that if such port or ship had ever existed there would be a possibility of the plant having been introduced by it. The words mean nothing else. In his reply Mr. Praeger does not take the slightest notice of having made this admission. But he cannot get over it.

Then, as to the Mills and Distillery at Comber, Mr. Praeger, who, in his original account, did not even allude to their existence, now tells us he knew all about them, and the seeds they deposit about Comber. While he would have us understand that nothing but "Corn weeds" seeds are ever imported with Mediterranean barley. Why, I know of fourteen grasses that have been from time to time so imported, and specimens of some of these are now in my herbarium. It would be an interesting experiment to get a bag of the siftings and sweepings that contain these foreigners, and grow them for a season.

I did not state that the cargo or cargoes of which I had been informed, and which I quoted, was the only Mediterranean grain that had ever

been used at Comber. I have a guess that some of the barley that has been coming into the British Islands, to the enormous amount of 150,000 tons per annum, chiefly from Asia Minor and the Levant, has come to Comber. And this it is which, owing to careless growing and threshing, is the source of the foreign seeds which are everywhere, and which give rise to the multitudes of casuals found about distilleries and malt-houses.

And though Mr. Praeger mentions only Northern Italy as a place where this plant does grow, Dr. Rendle gives "Taurus" as a locality, and this Taurus I take to be that district of Asia Minor close to the Levant, in which is the mountain range called Taurus. So much for the argument of no grain coming to this country from a port in a district where the grass grows. I should like to be clear of all doubt before including this plant amongst the natives of Ireland, and this can scarcely be till it is proved that Comber Distillery has never existed!

As to Mr. Praeger's sweeping assertion:—" *Glyceria festucaformis* does not grow in Algeria, nor in Egypt, nor indeed anywhere on the southern shores of the Mediterranean; and with the failure of this keystone of the arch, where is our hypothesis?"

The keystone is all right—my theory has met with no reverse; quite the contrary, for Mr. Praeger is woefully wrong here. Now look at these facts.

In the Flora d'Alger, of Battandier et Trabut, 1884, *Glyceria distans* v. *festucaformis* is recorded from Batua, Oran, &c., in Algeria; in Ball's Spicilegium Floræ Marocanæ, *Glyceria festucaformis* is recorded from Tangier; and in Post's Flora Syria, *Glyceria distans* (our plant) is recorded from "Syrian dessert." But as neither Dr. Rendle nor Mr. Praeger refer to these works—especially the first two—it affords me much pleasure to introduce them to their notice.

Mr. Praeger has pulled down upon his own argument an incubus which neither his boldness nor skilful pen can remove. The crushing demolition of his reply is complete.

H. W. LETT.

Loughbrickland.

The last paragraph of the above note is the only one on which I need comment, as affecting my statement in the last number of this Journal. The obvious slip which I made regarding the Mediterranean range of *G. festucaformis* had already been pointed out to me. This grass does grow, as do many of our native maritime plants, on the southern shores of the Mediterranean. The remainder of Canon Lett's note seems to me somewhat beside the point. I wish also to correct my reference to a journey across "eight miles of sea." The distance by water from Comber to the nearest point of the plant's range, as at present known, is half as great again—namely, twelve miles.

R. LLOYD PRAEGER.

Dublin.

BIRDS MET WITH IN THE SHANNON VALLEY.

BY R. J. USSHER, D.L.

THE largest river in the British Islands, with its great lake expansions, was, until twelve years ago, as unknown to me as it is to many a naturalist and tourist even in our own island; but since in 1892 I began by exploring Lough Derg and Lough Ree, I have become familiar with aspects of bird life almost absent from the eastern and southern parts of Ireland.

Lough Derg runs a tortuous course for twenty-seven miles, with two branches, which form the bays of Scariff and Youghal. The shores are much diversified with wood, some of which is natural. There are many small islands and considerable reed beds, which afford nesting-places to various waders and water-fowl, while mountains overlook the lake in certain parts, heightening the grand effect of the lake and its surroundings.

I was hospitably entertained at Castle Lough, which forms a projecting part of the Co. Tipperary shore, and here vestiges of the native forest intermix with more modern timber. The proprietor, Mr. Anthony Parker, has a collection of the birds of Lough Derg in his hall, and in a list of those he had observed he mentioned the Garden Warbler. Not expecting a bird so little known in Ireland, I asked him for a specimen, and in May, 1893, I received from Castle Lough a bird of this species, recently shot. The interest excited by this specimen was enhanced by the statement that Mr. Parker had discovered a nest, which, on my visiting him a few days afterwards, he showed me in a deep bed of briars not far from the house. I was able, in this case, to identify the bird which owned this nest, which, to establish the discovery, was taken, and is in the Dublin Museum. The warning note is a ticking sound quite unlike the churr of the Whitethroat. Both before and after the taking of this nest I heard the song of the male birds near that and several other spots in the Castle Lough woods and grounds. A cautious observer might at first think it came from a Blackbird, but it is more voluble and varied. The bird does not dwell on its notes, but hurries over them and then ceases, to recommence after an interval in some neighbouring tree or brake to which it had made its way unobserved; for to

see this sweet songster is seldom possible, the art of hiding itself among the foliage being practised with great skill, as in the case of the Blackcap and other warblers.

I subsequently found that the Garden Warbler is a regular summer visitor to the islands of Lough Ree, to the woods of Castle Forbes, and to Loughs Key and Arrow, further north, as well as to Castle Cauldwell on Lough Erne, where it was known to Sir Douglas Brooke and Mr. Bloomfield.

Launching on Lough Derg, a little stony islet overshadowed with willow trees was found to contain the nest of the Common Sandpiper, while on a stony point that projected into the lake, Ringed Plovers' eggs were found, and an excited Redshank, whose home was also near, stood on the top of the old castle uttering her alarm cries.

In the open lake, near Castle Lough, is a wooded island frequented by sundry Mergansers, which took flight before we landed, and which nest in June among the thickets and coarse herbage. On the open, rushy part of this island we found nests of the Reed-Bunting, that most characteristic land-bird of the Irish lakes, whose monotonous "chit-chit chatter" is to be heard on every island.

Next, crossing towards the Clare shore, we came to a group of low, grassy islands, the home of several pairs of Common Terns and also of Redshanks, that circled over us with their piercing cry. Black-headed Gulls had a small colony there, partly on the grassy islands and partly on isolated rocks near them. One of their nests was on the top of one of those stone pyramids built for beacons. Crossing an island, I observed two birds on the water of a little bay which were resting unsuspectingly. They were gathered up with puffed-out plumage and necks drawn in, and looked not unlike Coots, but on their perceiving me their long necks were raised, showing white in front, and I recognised them as they dived to be Great Crested Grebes. Searching the little bay I found their nest with a fresh-laid egg covered up.

Proceeding up Scariff Bay, we came to extensive beds of great rushes growing in the water, from which issued two small specimens of the Crested Grebe, fully fledged, which were joined by an old one upon the lake. There are many breeding places of this species round Lough Derg and Lough

Ree, as well as in most of the Irish lakes, but where the bottom is rocky, as in Lough Corrib, they seem to be absent.

Returning towards Castle Lough we saw a pair of Lesser Black-backed Gulls on Scilly Island. These Mr. Parker observes to arrive in early spring on Lough Derg, where they may generally be seen during the breeding season, though their nest has not been found. Lesser Black-backs have nests on the stony islands of Loughs Mask and Corrib, and on the foreshore of an island in Lough Erne, while colonies exist on inland bogs and mountains, as well as on the sea coast.

The water birds I have described as nesting on Lough Derg quit it in winter, when they perform a local migration to the coasts and estuaries; but this lake is also visited on migration by Whimbrels in May, and further up, at Banagher, I was told that flocks of "Gadwings" are seen on the Shannon shores in February or March, birds larger than Redshanks, whose beaks are long, like those of Woodcocks. I wish some resident there would shoot one, and let us see if they are Godwits. In any case they are migrants.

Among the birds obtained on Lough Derg, which are preserved at Castle Lough, are the following marine species:—Scaup, Long-tailed Duck, Great Northern Diver, Great Black-backed Gull, Pomatorhine Skua, and Stormy Petrel; while at Bal Ivor I saw an Oyster-catcher, which had been killed on the Little Brosna, a tributary of the Shannon.

These specimens show that even sea-birds make use of the great water-way of this river, which affords a route from north to south, and *vice versa*, without passing round the stormy and remote coast of western Connaught.

While following the Galway shore of Lough Derg I saw many pairs of Mergansers and some Great Crested Grebes; there were Redshanks at intervals and Lapwings, evidently breeding, many Black-headed Gulls, and an occasional Common Tern. At the northern end of the lake, on several small islands that skirted the demesne of Lord Clanrickarde, Wild Ducks had their broods, and a Mallard that I surprised flapped along as if his wing were broken, evidently to allure me from the young. If this were his object it evinced a care for his progeny with which the male duck is not credited. At Church Island I started a brood of ducklings in clover

which rushed into the water. The female parent at once flew out in front, displaying herself before me. She had the broad bill and pale blue wing coverts of a Shoveler. Near this place young Shovelers were shot on 11th July, 1863, as recorded by Mr. G. H. Kinahan, and since then this species has greatly increased as a breeding bird in Ireland. I have met with it in Scariff Bay, and I was assured that it breeds above Banagher, along the back rivers or side channels of the Shannon.

The Stock Dove was first noticed in the vicinity of Lough Derg in 1896 by Mr. Hibbert, of Scariff, and in more recent years Mr. Parker has frequently found it at Castle Lough, where he believes it nests. This is the most western district in Ireland known to me to which the Stock Dove has spread.

Travelling by boat up the Shannon, from Banagher to Athlone, one sees an almost uninhabited country. There are no extensive swamps nor reed beds, but the broad river flows between green "callows," which are meadowed in summer and often flooded in winter, with boundless, high, red turf-bogs on the Galway and Roscommon side, and in places on the eastern side, too. Trees are scarce or absent. The most noticeable bird in spring and summer is the Curlew, which is frequently seen feeding on the river-banks or flying to and fro; it breeds on these great red bogs. Redshanks are also numerous; they nest in the callows, which are full of Meadow-sweet. As the boat proceeds, the Common Sandpiper starts from many a point with its clear cry, and wings its way across the gliding flood. At several places, chiefly above Banagher, I saw Dunlins in breeding plumage, busily catering for their mates or young. Black-headed Gulls occurred all along the river, but not in large numbers; they have breeding colonies on the Westmeath bogs. Coots were numerous, and Dab-chicks repeatedly met with, and here and there a Heron; I saw one of these chased vehemently by a Lapwing from its nesting-ground. Skylarks and Corncrakes were often heard, and Reed-Buntings several times, while Swifts were frequently dashing past. The song of the Willow-Wren, more than any other sound, enlivened this great lonely river, even in parts where there seemed to be hardly a willow to hold the bird.

The stately round towers and ruined churches of Clonmacnoise overlook the great water-way and its wilderness of turf bogs, and here was seen a Corn-Bunting, a bird not often met with in the interior of Ireland, though in the maritime counties it is common enough. Near Athlone a Lesser Black-backed Gull was on the river; it is partial to the vicinity of river towns on account of the offal to be got there.

At Glynwood, on the Westmeath side of Athlone, is preserved a fine Greenland Falcon, which the butler took alive with a hand-net, when it was quite fatigued, at Glenmore in Co. Donegal. It lived in confinement for about five years.

Lough Ree, the second largest of the Shannon lakes, is broader than Lough Derg in its lower half, and its deep bays contain extensive reed beds, which are inhabited by great numbers of Coots. I found that the nests of these birds had been flooded by a rise in the waters of the Shannon, and some of them had since been raised with fresh materials, and fresh eggs laid above those that had been swamped.

Lough Ree is a special resort of the Great Crested Grebe, whose croak, coming across the waters, attracts attention to its tall white throat, surmounted by its tippetted head. One little lagoon that I visited contained more than one nest of this bird with newly-laid eggs. The nests are not usually made until June, when the rushes are grown sufficiently to conceal them; these structures are low platforms of rotten rushes, but little above the water, and sometimes have pond mud upon them. I never saw so many nests of Little Grebe as on Lough Ree; they were floating lumps of aquatic herbage, which contained uncompleted clutches on 7th June; but in a lagoon the nestlings had just emerged, and on our approach one of these immediately took to the water and dived, using legs and wings for a short distance, and on emerging dived again and again.

On some small sedgy islands, and on a lonely shore, I found nests of Tufted Duck with fresh eggs. These birds, of which several pairs were seen, were looked upon as a new breeding species in 1892, but the young of the Shoveler had been previously obtained when flapper-shooting.

The Black Islands, in an unfrequented portion of the lake, belong to Co. Longford. These were formerly resorted to for illicit distillation; they are now haunted in the breeding

season by Lapwings, Ringed Plovers, Redshanks, Common Sandpipers, Dunlins, and Tufted Ducks, while here, as elsewhere on Lough Ree, Mergansers make their home.

Further north, on an island in the middle of the lake called Incheleraun, stands a group of ruined churches. The rich grass is broken in places by huge masses of briars. From these proceeded, during my visit, the song of the Garden Warbler, which I had heard in 1892 and 1893 on Nun's Island lower down the lake. I heard this song again in the woods of Castle Forbes, which skirt Lough Forbes, a smaller expansion of the Shannon further north than Lough Ree, and I was fortunate in finding the nest of the Garden Warbler, containing young. It was among low briars in the wood, and was composed of fine dry grass stems. On the stony beach were Ringed Plovers and Sandpipers, and a Lesser Black-backed Gull appeared on the wing, which seemed much discomposed at my presence. Tufted Duck swam off from the reed beds, where Wild Ducks were accompanied by their young broods. I saw several Terns and Black-headed Gulls over the lake, and, from the number of the latter seen from the train at one spot on a neighbouring bog, they must have a breeding-ground there.

I next explored Lough Allen, which lies nearest to the source of the Shannon. Its upper portion is closely shut in by mountains, which makes it liable to those dangerous gusts so much dreaded by boatmen. On two small islands, composed of boulder stones and gravel, I found that colonies of Black-headed Gulls and Common Terns had eggs on 3rd June, but no young were yet hatched. A male Wigeon was plainly seen taking flight from one of these islands. He was accompanied by another bird, presumably the female. Lesser Black-backs were on this lake also. At the north-west corner of Lough Allen is a small wooded island; between the low trees and the stony beach is a margin of Meadow-sweet and other rank herbage. In this I found the tortuous run of a Duck, and on following it up found a female Merganser, which flapped away almost from my feet. The ten fresh eggs were well surrounded with down in a comfortable nest.

FURTHER CAPTURES OF *MYTIS RELICTA* IN IRELAND.

BY W. F. DE V. KANE, M.A., D.L.

I HAVE to announce the discovery, in June last, of a third Irish locality for *Mytis relictæ*, Lovén, when dredging in Lough Corrib at a depth of from 110 feet to 132 feet, at the Cong end of the lake, off Coagh Island. The specimens were small in size and not plentiful, the largest haul being fourteen. I tried various lesser depths in vain. The bottom was generally soft mud, but the successful dredging was done on gravel, or stiff mud strewn with some stones. In Lough



Fig. 1. Embryo of *Mytis relictæ*. Early stage. Magnified.
From brood pouch of female. Lough Erne. February 11, 1904.

Neagh, on the other hand, my experience has been different, a bottom of hard sand and gravel in July proving unproductive, the animal only occurring on the mud. Nevertheless, I am told by Mr. R. Welch that in the early summer he found gravel the most productive ground in the northern end of that lake. But I have had similar experiences in Lough Erne throughout the summer, and so late as the 30th of November, finding mud the most profitable, both in shallow waters and in the deepest soundings. It is evident, therefore,

that this crustacean moves in shoals in search of its food, and that no certain rule can be laid down as to its feeding grounds up to the present. Moreover, the instrument used for its capture must be taken into consideration. I understand that Mr. Welch used a small marine dredge; and this, however lightly it may be made, must, I think, sink more or less in the mud, and thus collect only occasional specimens, whereas, on hard ground, more success would result, even though the animals were scarce. I am not able to state any-

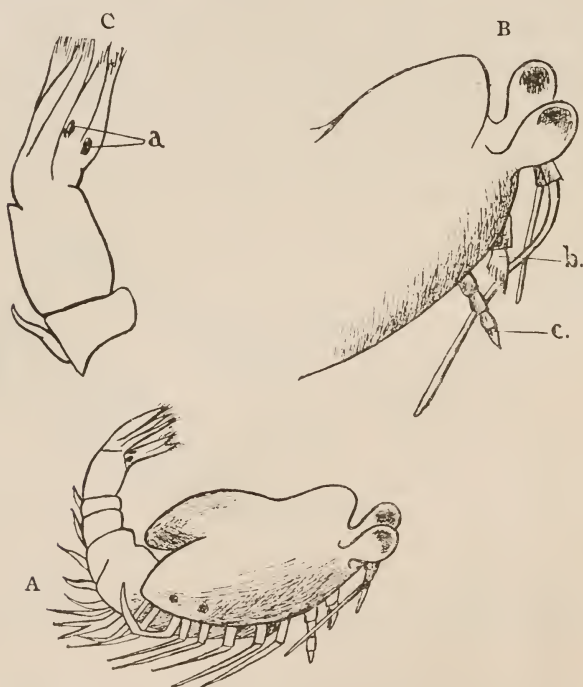


Fig. 2. A. Embryo of *Mysis relicta*. Later stage. Magnified.
From brood pouch of female. Lough Erne.
February 11, 1904.

B. Head Region. } More highly magnified.
C. Tail Region. }

a. auditory organs. b. maxilla. c. gnathopod.

thing as to the abundance or otherwise of *Mysis* elsewhere in Lough Corrib, for I had no opportunity of testing any other

portion of this large sheet of water. Its absence from Lough Mask, as well as Lough Conn, Lough Melvin, and Lough Oughter, of which I have convinced myself, seems to me very significant, as bearing on Lovén's theory of its marine origin and introduction; but before drawing any conclusions, I am anxious to gather more facts, and to extend my researches to the Shannon, Lough Derg, Killarney, and the Mullingar lakes. Up to the close of 1903, the largest Irish specimens I had met with measured from the tip of the antennal scales to the extremity of the telson 20 to 22 mm. Being desirous to ascertain the maximum growth attained, and to know something about the winter development of the ova and young, I procured some specimens in Upper Lough Erne on the 11th February ultimo. On the ground where they had been plentiful in past summers none were taken, but two short hauls in the deepest hole in that portion of the lake produced 28 female specimens, showing that probably they frequent deeper water in winter. No males were seen. The average size was considerably greater than any that I had yet seen. Four selected at random measured 22, 23, 23, and 24 mm. respectively, the latter being within 1 mm. of the length of those from Lake Onega recorded by Czerniavski. A mass of embryos in various stages of development distended the incubatory pouches. The auditory organs in the pair of caudal lamellæ were distinctly represented by dark spots (see fig. 2, a), and from two to four similar spots in some specimens on the sides of the ventral region of the abdomen, near its junction with the cephalothorax, indicated the incipient abdominal ganglia. Van Benèden has described the embryology of the genus, but it is possible that no data have been hitherto available as to the condition of development of *M. relicta* at this season, since other European habitats in the fresh waters of Scandinavia, Finland, Russia, &c., would probably be frozen over in February.

Drumreaskie, Monaghan.

CHANGES ON THE FORESHORE OF BELFAST LOUGH.

BY SIR R. LLOYD PATTERSON, D.L., F.L.S.

THE preparation of my note on Herons, &c., which appeared in the last number of the *Irish Naturalist*, directed my attention more particularly than usual to a matter I have been noticing for some time back—namely, the great changes that have been going on within living memory, but particularly during the last twelve to fifteen or eighteen years, in the character of the foreshore on, at least, the Co. Down side of Belfast Lough.

Late in the “forties” the County Down Railway Company constructed the Holywood section of their line, reclaiming, about Conn’s Water and lower down all the way along as far as opposite the Palace grounds at Holywood, a very considerable extent of land from the sea, and at the same time throwing the embankment across from the railway to the point of the Kinnegar; but even long after that the sea came up close to the present Queen’s Quay terminus and covered the ground where the coal sidings are situated and some of the workshops and other buildings now stand. In fact, the railway skirted the sea all the way from just outside Belfast station to the Kinnegar embankment near Holywood, except for the very short distance where it cut through the point fields at Sydenham, then called Ballymisert; Queen’s Island (formerly called Dargan’s Island), and the Twin Islands—both works the result of harbour improvements—were then really islands. At various times further reclamations of land were made; Queen’s Island was united with Queen’s Quay, which had itself not so long before come into existence, and the former flow of water through the old channel at the back of Queen’s Island was consequently stopped, and a great extent of land right down to Sydenham reclaimed. Since then Queen’s Island and the South Twin Island have also been connected, so from Queen’s Bridge down to the eastern extremity of the South Twin Island now forms one continuous land connection. Some of the results of these changes are mentioned in my book on some of our local birds

&c., published in 1880. On p. 121 I find the following:—“Of the great expanse of banks in Belfast Bay, formerly all covered with the *Zostera marina* or grass wrack, those on the County Down side are rapidly changing their character, becoming hard and clean sand banks instead of soft ooze. A great physical change of this nature cannot fail to have some effect on the inhabitants and feathered frequenters of these wide flats.” The change here alluded to continued, gradually but very slowly becoming more apparent, till the dredging out of the Victoria channel, which was commenced in 1885 and finished in 1891, gave it a fresh impetus, and at the same time turned it partly into a new direction.

With the exception of the making of the quite recent Musgrave Channel, partly in the bed of the old channel wherethe training ship “Gibraltar” used to lie, no very material change—beyond the stripping of the *Zostera* grounds—is discernible from the outer point of the South Twin Island down to off the point of the Kinnegar; but from there all the way down the shore to Craigavad, a distance of between two and three miles, the change is very remarkable.

This change consists in a complete stripping off or denudation of the former surface of the bottom between high and low-water marks, of course to a varying extent, but in some places to as much as between two and three feet, or exceptionally even more, boulders of these sizes and ridges of sandstone which were formerly buried and concealed now standing out to the heights mentioned.

It is said that the land here is slowly sinking, and I believe it is so, for I remember the old pump at Cultra Point, the stump of which is now about twenty yards below, standing at the top of the sloping beach, well above ordinary high-water mark; and old Holywood people have told me they remembered it standing in the field¹; but even if this sinking is taking place it must be very slow, and would not, in any case, be sufficient to account for the phenomena observed, as boulders ridges, bottom, and all would have sunk *together*, and this is apparently not the case. Down to Cultra Point, which in

¹ See *J. N.*, ii., pp. 16–18, plate 1., 1893.—EDS.

itself being rocky, shows no change, and below which the foreshore was always narrower, and subject always to the varying influence of the wind, the tide is as far in now at two hours' flood as it was some few years ago at four hours' flood. While high-water mark remains approximately where it was twenty years ago, the low-water line is not within fully a quarter of a mile as far out from the shore as it used to be—I mean the tide does not now ebb, by a quarter of a mile or more, as far as it formerly did—and the water, when the tide is in, is deeper to the extent of the thickness of the denudation plus the sinking. The force and volume of the waves breaking on the beach or against the sea walls are thus increased, besides which the formerly softening effect of the *Zostera* is gone, as those responsible for the up-keep of the batteries and sea walls find to their cost. What has been stripped away consisted of soft estuarine ooze or mud, the accumulation of which had gradually, probably during many centuries, covered the original harder bottom, and the boulders that rested on it. A few years of artificial conditions seem thus sufficient to have undone the natural work of centuries. Changes in the animal life of the foreshore have quickly followed. The few remaining Holywood fishermen are now able to dig bait within one hundred yards of the foot of Shore Street, and along a considerable stretch running parallel to the railway, not farther away than that; while they formerly could not procure any nearer than Marino.

As to the birds: Curlews and Oyster-catchers are still seen abundantly; but I think their numbers are diminished by about one-fourth as compared with thirty to forty years ago. All the smaller waders, too, are less abundant, this remark applying specially to Dunlins, of which one never now sees the immense flights that were the delight of both the ornithologist and the gunner some years ago.

The quite recent filling in, in connection with the Musgrave Channel, has destroyed a great extent of the birds' former convenient resting and feeding grounds in the reclaimed lands between Conn's Water embankment and Queen's Island and that locality, which, particularly in wet or stormy weather, were frequented by great numbers of all the smaller waders, which seemed not to venture on their long flights in

unfavourable weather. The tide not ebbing as far as it did, and some of the grounds that are still available being covered by the incoming tide sooner, and left bare by the ebb later than formerly, have further reduced the extent of the birds' feeding grounds and the time within which they can procure their food, so the present diminished numbers of many species seem but a natural consequence of these altered circumstances. Often now one sees the birds flying down over the flood tide earlier than formerly. On returning to their feeding grounds over the falling tide, the birds frequenting both shores seem to come in massed flights to about as far as Cultra Point, when those that intend to remain on the County Down side keep straight on parallel to the shore, while those going to the Whitehouse banks on the north shore of the Bay strike obliquely across it westwards.

Croft House, Holywood,

REVIEW.

FOR EXAMINATION CANDIDATES.

Second Stage Botany. By J. M. LOWSON, M.A., B.Sc., F.L.S.
London: University Tutorial Press, Ltd., 1904. Price 3s. 6d.

This book, as its sub-title shows, is an adaptation of the same author's "Text-Book of Botany" to the requirements of the second stage examination of the Board of Education, South Kensington. Part I. deals in two chapters with the general external morphology, physiology, and histology of the Plant; the eleven chapters of Part II. are devoted to the Angiosperm; the remaining eight chapters of the book, comprising Parts III. and IV., treat of the Vascular Cryptogams and their relations to the Flowering Plants, and of the Lower Cryptogams. There are also two appendices, and some sets of examination questions. The unfortunate divorce between morphology and physiology, which usually takes place in books of this kind, occurs as early as the second paragraph of the Introduction; the former, with its thousand and one technical terms, claiming and obtaining henceforward preferential treatment, to the detriment of the latter, which is practically dismissed in a couple of chapters. The author lays stress on the necessity of practical work it is true, but the few experiments which he suggests in the physiological part of the book are put forward in such a half-hearted fashion, and usually in such meagre outline, that the student would probably never dream that they were meant to be performed. It would be well nigh impossible, for instance, for a student to set up a so-called "water-culture" from the barest hints given on p. 132, and doubtless he would

judiciously skip Question 5 of the Examination Paper of 1903! A book of this kind is bound to be more or less dogmatic in its character rather than suggestive or stimulating, and in his facts the author is, on the whole, concise and up to date, though here and there a questionable statement is made. On p. 126, for instance, it is erroneously stated that the cells of the palisade parenchyma of a leaf are *without intercellular spaces*, a mistake which is also introduced into the diagram on the following page. The explanation of the presence of annual rings in wood as being caused by transverse pressure is quite inadequate, and it is not strictly correct in speaking of the root nodules of the *Leguminosæ* to say that the "bacterium" or fungus is *always* present in the soil.

The author can scarcely be blamed for the syllabus he feels himself called upon to write up to; and since the first and only obligatory question in each of the examination papers given at the end of the book is concerned with plant description, we must give him credit for sparing no pains in providing the unfortunate student throughout the book with a dose of technical terms which will probably serve him a lifetime. Thus we find such a simple thing as "leaf-fall" is preferably to be known as "phylloptosis," and when we read as the final sentence, "Fruit: a pseudocarp consisting of an ætario of achenes borne on a succulent thalamus" we close the book with a shudder. Strawberries without the cream, indeed!

"Test-tubing" has been successfully chased from the chemical laboratories of our schools; when will some strong man arise and stamp out the equally soul-destroying description of "specimens" in technical terms from our botanical classes, and so make unnecessary the writing of large parts of such books as the one under review?

GEO. H. PETHYBRIDGE.

NEWS GLEANINGS.

New Royal Irish Academicians.

At the Annual Meeting of the Royal Irish Academy, held on March 16, the following were elected members:—William Frederick Bailey, B.A. (Dub.), Estates Commissioner, Dublin; Rev. Edward Alfred D'Alton, C.C., Belcarra, Co. Mayo; Prof. Andrew Francis Dixon, M.B., Sc.D., (Dub.), Trinity College, Dublin; John Fraser, M.A. (Dub.), Fellow of Trinity College, Dublin; William Alexander Goligher, M.A. (Dub.), Fellow of Trinity College, Dublin; Very Rev. James Joseph Kelly, D.D., Dean of Elphin, Athlone; Thomas Philip Lefanu, B.A. (Cantab.), Bray; Prof. Kuno Meyer, Ph.D., Lecturer in Celtic, Liverpool University; Prof. William M'Fadden Orr, M.A., Royal College of Science, Dublin.

At the same meeting the following names were added to the Council:—W. F. Adeney, D.Sc.; Prof. F. J. M'Weeney, M.D.; Prof. Gregg Wilson, D.Sc.; Sir T. H. Grattan Esmonde, M.P.; Edward Gwynn, M.A.; and T. J. Westropp.

The Chair of Botany in Trinity College.

With much regret we have to record the retirement from the Professorship of Botany in Trinity College of Dr. Edward Perceval Wright, who has held this chair for over thirty-five years. Dr. Wright's name and his scientific record are so well known, that they need hardly be referred to here. Abroad, he tasted the delights and fatigues of tropical work in his exploration of the Seychelles in the Indian Ocean. At home he carried out many researches, both botanical and zoological, and did a vast amount of work in the arranging of the splendid herbarium of Trinity College. To supporters of the *Irish Naturalist*, to which Dr. Wright has ever been a helpful friend, the leading part which he took in the founding and management of the *Natural History Review*, is of special interest. We are pleased to learn that Dr. Wright's connection with the Botanical Department of Trinity College is not to be altogether severed, as he retains the post of Keeper of the Herbarium.

Dr. Wright's successor is Dr. Henry H. Dixon, for some years past his Assistant, whose name is already known throughout the scientific world for his brilliant researches on plant physiology, and notably on the ascent of sap and similar subjects, much of the work being done conjointly with Professor John Joly. We wish Dr. Dixon a career as long and distinguished as that of his predecessor,

Dublin Museum.

Miss Jane Stephens, B.Sc., a Graduate of the Royal University of Ireland in Natural Science, has been appointed a Temporary Assistant in the Dublin Museum. Miss Stephens studied at the Royal College of Science, Dublin, and University College, London, and has received a zoological training which has specially fitted her for Museum work. She is now engaged in naming and re-arranging the large collection of Marine Invertebrates—a work which was much needed.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Grass Paraket from Lord Ednam, a Black-backed Gull from Mr. E. Robinson, and a Tortoise from Mr. D. N. P. MacLean. Ten Monkeys and two Spoonbills have been purchased. The young Elephant, "Padmahati," after several months training, is now able to carry passengers and to perform a number of intelligent tricks.

Mr. H. M. Barton, for many years Treasurer and Vice-President, whose recent death caused the deepest regret to the Council, has left, by will, £100 to the Society. It has not yet been decided to what purpose this money shall be devoted, as there are several suggested improvements which the Council propose to carry out if funds be available.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

MARCH 22.—A lecture was given by SEATON F. MILLIGAN, M.R.I.A., F.R.S.A., on "Around Youghal and the Blackwater with the Royal Society of Antiquaries."

BELFAST NATURALISTS' FIELD CLUB.

GEOLOGICAL SECTION.—This Section has recently resumed active work, with James Orr as Acting Secretary. Several winter excursions have been held. On the afternoon of February 13 over 20 members visited the geological collections in Queen's College Museum, being conducted by George C. Gough, F.G.S., Lecturer on Geology in the College. On February 27 a large party visited Carnmoney Hill, where the quarries were examined with care.

CORK NATURALISTS' FIELD CLUB.

FEBRUARY 26.—Miss H. A. MARTIN gave a lecture on "Insectivorous Plants," illustrated by lantern slides. She also exhibited a number of botanical specimens collected on the excursions conducted by Prof. Johnson last year.

APRIL 4.—The first excursion of the session took place. The party, numbering twelve, went by rail to Raffeen, and walked, *via* Ballea Castle to Carrigaline, thence home by train, conducted by Messrs. J. L. Copeman, R. A. Phillips, and James Porter, B.E. The physical and geological features of the district were shown on sketch contour maps, with transparent geological covering sheets prepared by Mr. Porter.

From Raffeen the route lay over the Carboniferous slate for about three miles to Ballea, along its junction with the limestone which here overlies it, the chief feature being the post-glacial ravine of the Owenboy river. The drainage of the ten-mile section of the synclinal valley from Upton to Ballea, originally consisting of an eastern and a western system, uniting at Five-mile-Bridge to form a southward-flowing stream, was upset through the closing of the southern exit by a deposit of glacial clay. The waters accumulated to form a long narrow lake, which found an exit over a depression at the extreme eastern end. The escaping waters had such a fall into the Carrigaline valley on the south that they were able, since the glacial period, to cut the picturesque ravine of Ballea. It was almost too early in the season for plant-collecting; but among those noted by the botanists may be mentioned *Barbarea praecox*, *Cochlearia anglica*, *Senecio vulgaris* var. *radiatus*, *Euphorbia hiberna*. Of *Arum maculatum* about a dozen clumps of the spotted form were noticed, while one plant, found by Mr. Copeman, had beautifully variegated leaves, all their midribs and veins being bright yellow.

ULSTER FISHERIES AND BIOLOGY ASSOCIATION.

MARCH 23.—A most successful conversazione was given by the President and Council in the Queen's College, Belfast. The guests numbered several hundreds. After tea, which was served in the Entrance Hall, the guests proceeded to inspect the large series of exhibits in the Natural History Museum upstairs.

The list of exhibits was as follows:—Table A, (1) Collecting apparatus, (2) copepods of Larne district, (3) living specimens from Larne Harbour, Mr. Pearson; Table B, (1) physical apparatus for marine work, (2) foraminifera of Larne district, Mr. Gough; Table C, sponges of Larne district, Miss Patterson; Table D, sea-anemones of the district, Mr. Gallway; Table E, annelids of the Larne district, Mr. James Orr; Table F, crustacea of the Larne district, Mr. Rankin; Table G, bivalves of Larne district, Mrs. R. Patterson; Table H, gastropod molluscs, cuttle-fishes, &c., Messrs. Green, Walpole, and Welch; Table I, (1) maps showing results of experiments for determining surface drift, (2) local polyzoa and brachiopods, Mr. Cunningham; Table K, birds of Larne district, Mr. Workman; Table L, seaweeds of Larne district, tunicates, fishes, &c., Mr. Thornton; Table M, (1) demonstration of effects of gases on ciliary movement, (2) demonstration of methods of recognising animal and vegetable pigments, (3) demonstration of effects of different forms of light upon the development of the eyes of fishes, &c., Professor Milroy.

About 9 p.m. the guests assembled in the Examination Hall, when a lecture was given by Professor Gregg Wilson from photographs of the work at Larne, shown by limelight.

MARCH 30.—A public lecture on "Trout Culture" was delivered by Professor Gregg WILSON, D.Sc., in the Belfast Museum. The chair was occupied by Walter H. Wilson (President of the Belfast Chamber of Commerce, and President of the Belfast Anglers' Association), and there was a large audience. After referring to fish farms, the lecturer gave a detailed account of the life-history of the Trout, pointing out the conditions necessary for its welfare, and illustrating the best kinds of natural food to be introduced and encouraged in lakes and rivers, and the shelter which should be provided for the young. The various enemies of trout were described, and means for their destruction suggested. The lecture was illustrated by lantern slides, live trout, and hatching boxes, and was favourably discussed by F. J. Kennedy, R. Welch, and J. M. Dickson.

NOTES.

BOTANY.

Some Cork Plants.

During a short visit to Cork harbour last summer the following few plants were noticed in the neighbourhood by the Rev. E. S. Marshall and myself:—*Atriplex littoralis*, Linn.—sparingly on Brown Island at the back of Great, or Queenstown, Island, East Cork. *Potentilla procumbens*, Sibth.—frequent about Crosshaven and Currabinny, Mid Cork. *P. suberecta*, Zimm. (= *P. procumbens* × *sylvestris*)—with the above, frequent; while Mr. H. W. Pugsley names a *Fumaria* gathered on Currabinny strand, "*F. Boræi*, Jordl., var. *serotina*, Clavaud."

R. W. SCULLY.

Dublin.

ZOOLOGY.

Paludestrina (Hydrobia) Jenkinsi.

Mr. J. D. Dean, in the *Journal of Conchology*. vol. 11, p. 15, gives some interesting notes on the way certain fish in his aquarium behave with regard to this species, Carp evidently preferring it to ordinary food; but not so Perch, Roach, or Dace. He also speaks of the statement that the mollusc seems to have "taken over" a locality to the exclusion of other species of shells, but has heard no reason assigned for this. In Ireland we hardly have had time to work out this question. At the station where it was first found—little brackish pools on the margin of the Bann along Portstewart sand-dunes—it certainly lives by itself so far. That is not the case, however, in a wide shallow drain near Coleraine bridge, where it lives with *Limnæa peregra*. In the Newry locality (*I.N.*, vol. viii., p. 271) the latter and *Planorbis spirorbis* are abundant in the drains. Recently (on March 1) Mr. J. N. Milne turned up plenty of *P. Jenkinsi* with *Aplexa hypnorum*, *L. peregra* and *Planorbis spirorbis* in a shallow drain along the railway that we were examining, quite close to Limavady junction. This is a new station for the species, and an interesting one; for Mr. Milne, who has worked these drains for many years, is absolutely certain it was not there three years ago, but is a later introduction. It will be worth watching to see how the species behaves here. The drain is on the inside of the rail embankment, and we could not find it in the one on the outside. About ten days later I made careful search for it in many drains and pools, in the intakes along both sides of the line between Eglinton and Culmore stations. I did not see a trace of the shell alive or dead, and evidently missed the pool near Culmore where Mr. Milne got the fine coronated specimens some years ago. It is quite possible that the species is still very local here, though it is plentiful in the Foyle not far away.

R. WELCH.

Belfast.

Injuries to Pollan in Lough Neagh.

People who are in the habit of using Pollan—the “fresh-water herring” of the old writers—from Lough Neagh as an article of diet, occasionally observe injured specimens, even to the extent of having pieces torn from their backs. Inquiries have been made as to the cause, which seemed to be not a little mysterious, and since I reside not far from the lake, it was suggested that I should endeavour to ascertain the real cause. I therefore questioned a number of persons engaged in fishing in the lough. Too frequently Lough Neagh fishermen are the last persons from whom to glean information concerning the great sheet of water they should know so well; but on this subject I was greatly surprised at the readiness with which I received answers, and in five consecutive instances all to the same purpose, namely, that the said injuries were caused by the “ramper eel,” a local term for the small Lamprey or Lampern, which is about ten inches in length. This, like all the lampreys, has a mouth formed for suction, and is frequently seen by fishermen adhering to the backs and sides of Pollan, even while confined in the net; and so effectually does it attach itself that when out of the water, it is at times with great difficulty that it is separated from the pollan. The wounds previously mentioned are declared to be caused by this sucking process, which may be so severe as to cause the death of the fish. When this is not the case, the marks of the wounds are never wholly effaced.

This small Lamprey, it appears, does not confine its attention solely to Pollan, but attacks Trout also. And when the attack is effectual, that is when the Lamprey has secured a proper hold, the trout becomes greatly agitated, darts wildly about, and occasionally leaps high into the air in its endeavour to rid itself of its foe.

The evidence thus far gained seemed conclusive as to their being one cause only for the injuries referred to, but the last person engaged in fishing spoken to did not believe the “ramper eel” was the cause of the mischief, but that it arose from Cormorants, and gulls of a particular kind, diving and attacking the Pollan while confined in the nets. Here was a surprise. That the Cormorant, with its formidable hooked bill, is capable of inflicting grievous injuries, is not to be for a moment doubted, and some gulls have powerful ones too, so that the evidence, while a little conflicting, appears to show that the wounds in Pollan are caused, not only by the small Lamprey, but also by Cormorants and gulls.

W. S. SMITH.

Antrim.

Stone Curlew in Co. Donegal.

Mr. W. S. Taylor reports to me that a Stone Curlew (*Edicnemus scolopax* Gmelin) was shot by Mr. G. J. W. Edwards at Magheragallen, Gweedore, Co. Donegal, on 12th October, 1903.

D. C. CAMPBELL.

Londonderry.

Bittern in Co. Waterford.

A very fine Common Bittern (*Botaurus stellaris*) was shot within a mile from here on 5th February, 1904. The farmer who killed it brought it home, and kindly made me a present of it. It has gone for preservation to Messrs. Williams & Son. Mr. Williams says it is a male. He also says that he could not see anything in its stomach. Mr. Ussher has many interesting observations on the Bittern in his "Birds of Ireland," particularly with regard to the time of its occurrence. Out of 105 instances noted, it appears that December is the month in which the greatest number have been obtained. In "British Birds," by W. H. Hudson, there is a fine coloured plate of the Bittern, by the celebrated bird artist, A. Thorburn. It is, however, doubtful whether it is as true to nature as the plate by Frohawk, in "British Birds," by various authors, vol. 4. Most observers say that the bird during the day remains with bill erect and pointing upwards. The latter is the way in which it is drawn by Frohawk. This is the first occasion in which I have seen this really beautiful bird in the flesh.

WILLIAM W. FLEMING.

Coolfin, Co. Waterford.

Rough-legged Buzzard in Co. Down.

In November of last year (1903) Mr. Richard Gardner shot a bird of this species (*Buteo lagopus*) in the neighbourhood of Hillsborough. Mr. Gardner kindly lent me this specimen, which measures twenty-five and a half inches in length and is therefore a female; and I have to thank Mr. Robert Patterson, who has examined it, and authenticates the record. Previously this bird had been obtained twelve times in Ireland, of which Co. Down can claim four, viz.—at Dundonald in 1831, at Killinchy (2) in 1831, and at Portaferry in 1895.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

Greenland Falcon in Donegal.

In the *Zoologist* for March, Mr. H. Eliot Howard states that an immature Greenland Falcon (*Falco candicans*) was trapped by one of the tenants on Horn Head last December.

Bat abroad in bright sunlight.

On 9th March, at one o'clock, p.m., I observed a bat (*Vesperugo pipistrellus*) busily engaged over a pond in pursuit of flies. The day was mild and bright, and, contrary to general belief, this bat did not seem at all discommoded by the strong sunlight, but flew about, ascending and descending in characteristic manner, and appeared quite an adept in evading the branches of trees overhanging the water.

NEVIN H. FOSTER.

Hillsborough, Co. Down.



Upper end of the Marsh, Bushy Park, Dublin.
The home of the smaller Hyalinizæ, Helices, Vertigos and Planorbis.

THE MOLLUSCA OF BUSHY PARK, DUBLIN.

BY R. WELCH AND A. W. STELFOX.

PLATE I.

THE rough little glens, filled with native scrub of Hazel, Birch, Holly, Ash, Oak, and Mountain Ash, which abound round the Antrim Coast and on the talus slopes of the greater glens of that county, have long been known as sanctuaries for a varied and in some cases rare molluscan fauna. This is also true of portions of Belvoir Park near Belfast, and possibly of some old wooded localities in Co. Wicklow. With these exceptions, the maritime counties of the east coast of Ireland do not seem usually to give what might be called a long list from a small area. By this we mean a list sufficiently large to show that the area worked was really what we call a sanctuary for our ancient fauna—such a list for instance as is yielded by Colin Glen, which is deeply cut in the Liassic, Cretaceous and basaltic rocks of the Belfast hills, or by Murlough, a little seaglen just south of Fair Head.

Such an area, however, exists well within the zone of the street lamps and electric trams of Dublin. Bushy Park, Terenure, with over 60 species of Mollusca—rather more than half the species which are known to live in Ireland—must be looked on as such a sanctuary. The fact that a marshy area, a stream, and some ponds occur in the demesne, in addition to woods containing old trees, places it, as an ideal habitat, before such glens as we have mentioned; and even before the damp limestone glens of Sligo, South Donegal, and Fermanagh, unless the presence of an old marsh area helps to enrich the fauna of the latter.

In Bushy Park, the high Boulder-clay scarp, along one side of the marsh, has probably been always wooded, first with native trees, later chiefly with introduced forest trees; and for the last 150 years the ground has lain undisturbed, so that the original fauna of this part of the Dodder valley has had every chance of survival. Mr. Praeger tells us that several rare Dublin plants, such as *Epipactis latifolia* and *Milium effusum*, still linger along this old wooded scarp, which is such a marked feature in the scenery of the Dodder River.

Bushy Park is in the Carboniferous limestone area, and some xerophile *Helices*, which are maritime dwellers in other parts of Ireland, even on the limestone of the north-west, come inland here and live in profusion in the short turf along the upper dry margin of the unwooded, grass-grown portion of the thirty-foot Boulder-clay scarp. This margin is characterized by the presence of such xerophile and calcicole plants as *Ononis arvensis*, *Carlina vulgaris*, *Origanum vulgare*, *Orchis pyramidalis* and *Eromus erectus*. It is baked as hard as brick in dry weather, but after a summer shower it simply swarms with *Helix ericetorum*, *H. virgata*, and *H. acuta*.

The marsh is the main stronghold of the smaller molluscs; *Vertigos*, small *Hyalinæ*, some *Planorbs*, and *Pisidia* live here in abundance. This marsh is a long, and, in the main, narrow strip, lying between the high Boulder-clay bank and a narrow ridge of limestone debris, supporting the wall which divides the demesne from the Dodder. A certain amount of it is perennially under water, but the major portion consists of wet ground, covered with an abundant growth of the rush, *Juncus glaucus*. It was formed some thirty-five years ago by the removal of a bed of river gravel, which formed a low terrace between the old scarp and the stream, the gravel being excavated down to the underlying Boulder-clay. The water which is brought from the Dodder by a conduit to feed the ponds in the grounds, runs into the marsh at one end and out at the other. Above this, along the artificial stream, there are many damp, mossy areas in the woods, with thick underbrush of briars and saplings. Other good ground is supplied by a large shallow pond below the house, full of *Myriophyllum spicatum*, Water-lilies, *Elodea*, and several species of Pondweed, and by an old waste area near the garden, where large quantities of cut logs are stored. These are remnants of the great trees blown down in the cyclone of February 28, 1903, and it was under them that most of the slugs were found.

Our first two visits were paid in September last, when we confined our attention to the marshy area and the dry bank above, collecting 46 species in all in about three hours. R. Welch afterwards visited, at the end of April, the woods, gardens, ponds, and greenhouses, in company with Sir F. W. Shaw, Bart. (the owner), and Mr. R. L. Praeger, when 16 more species were found in two hours' work.

LIST OF SPECIES.

- Vitrina pellucida**, Müller.—Dead shells plentiful in woods.
- Hyalinia cellaria**, Müller.—Common in suitable localities.
- H. Draparnaudi**, Beck.—(*Vitrea lucida*, Drap.)—This species lives in a pit in one greenhouse, and also among old building *debris* in waste ground near the garden. As so many mistakes have occurred in its determination in the past (see Adams, *Irish Nat.*, vol. viii., p. 82), we submitted specimens, through Mr. R. Standen, to the May meeting of the Conchological Society, when the members unanimously confirmed our determination. The size, over 13 mm., though none of the specimens were adult, and the deep cobalt-blue colour, almost indigo in some cases, mark it out clearly from even large *H. cellaria*.
- H. alliaria**, Miller.—A few at the marsh only.
- H. nitidula**, Drap.—Very sparingly in the woods, not quite adult.
- H. pura**, Alder.—A few of the brown var. *nitidosa*, at the marsh and in damp moss in woods. We did not see the type at all.
- H. radiatula**, Alder.—Some under stones at the marsh.
- H. crystallina**, Müller.—Common in damp mossy ground; found with *Cecilianella* among roots of a plant (*Aspidistra*) in a pot, 6 inches under the surface, in the green-house.
- H. fulva**, Müller.—A few in the woods and under stones in the marsh.
- H. nitida**, Müller.—Five specimens under two stones just outside the wall at the marsh, on the Dodder bank. A very local species, though sometimes plentiful where it does live in Ireland.
- Arion ater**, L.—A few, variable in colour, in the marsh and under logs.
- A. subfuscus**, Drap.—Fairly common.
- A. hortensis**, Fér.—Common almost everywhere.
- A. circumscriptus**, Johnst.—Under stones and logs.
- A. intermedius**, Normand.—At the marsh, rare.
- Limax maximus**, L.—Half a dozen very dark lilac specimens under logs in waste ground. Most unlike the northern Irish form, which is usually the spotted var. *ferussaci*, Moq.
- L. flavus**, L.—Some large specimens with the last. Seems to be very local in Ireland, especially in the north, but Dr. Scharff found it the "larder thief" of the Dublin cellars.
- Agriolimax agrestis**, L.—Common; some specimens near the garden were very dark purple (the var. *lilacina*, Moq).
- A. lævis**, Müller.—Very dark in colour and plentiful along margins of the shallow ponds in spring, and at the marsh in autumn. At the former locality some specimens were noticed crawling on stems of water-plants several inches below the surface of the water.
- Amalia sowerbyi**, Fér.—Abundant under stones and logs everywhere; one specimen was of a lead colour, not unlike *A. gagates* in that respect.

- Hellx pygmæa**, Drap.—Decidedly rare; under stones at the marsh only.
- H. rotundata**, Müller.—A high-spined form, not uncommon in green-house. Type common in most places, with a few of the flat form (*turtoni*, Flem).
- H. pulchella**, Müller.—The typical form was abundant in the dampest part of the marsh at grass-roots and under stones, but the ribbed form (var. *costata*), was only found on the very dry ridge between the marsh and the Dodder.
- H. hispida**, L.—A few on a bank near the marsh. This very common species of the north-east seems replaced in Co. Dublin largely by the next.
- H. rufescens**, Penn.—This is abundant everywhere, as usual on the limestone; though it is very local and usually rare in Ulster, where the previous species is common.
- H. virgata**, Da Costa.—Several colour forms abundant on the upper margin of the Boulder-clay scarp.
- H. ericetorum**, Müll.—Common with the last-mentioned. Some were the var. *lentiginosa*, Moq.
- H. acuta**, Müll.—The var. *strigata*, Menke, occurred equally commonly with the type, and was as local as the last two species.
- H. nemoralis**, Müll.—A few in woods and about brambles.
- H. aspersa**, Müll.—Local, mainly about old walls.
- Cochlicopa lubrica**, Müll. - Common.
- Cœclifanella acicula**, Müll.—The Agate Shell, an underground liver which we had never taken before, turned up first in a green-house, Sir F. W. Shaw finding one dead specimen under a pot of *Aspidistra*. On examining the earth about the roots of the plant five more specimens were found, some alive. Three days later it was taken alive and dead under moss on the ridge between the marsh and the Dodder, far away from the gardens. Dr. Scharff informs us that this rare species is noted as abundant from debris of the Dodder, in the Waller Collection, Natural History Museum, Dublin.
- Pupa anglica**, Fér.—Common in one greenhouse, and a few in woods in damp moss.
- P. cylindracea**, Da Costa.—Plentiful.
- Vertigo edentula**, Drap.—A few at the marsh alive in autumn; abundant under beech leaves in wood near the shell-house in spring, but almost all dead.
- V. pygmæa**, Drap.—Fairly common under stones at the marsh in autumn.
- V. substriata**, Jeff.—Very rare; at the marsh only.
- V. antivertigo**, Drap.—In profusion under stones at the marsh in autumn, but one specimen only seen in spring. Vertigos are, we find, usually rare under stones between March and September.
- Balea perversa**, L.—A few at the marsh only.
- Clausilia bidentata**, Ström.—Along the base of walls, on trees, in moss, &c., as usual.

- Succinea putris**, L.—A few at the marsh only.
- S. elegans**, Risso.—Crawling on the Brook-line (*Veronica Beccabunga*) and Water Forget-me-not (*Myosotis palustris*) at the marsh. In some specimens the animal was exceedingly dark.
- Carychium minimum**, Müll.—Almost everywhere in damp ground.
- Limnæa stagnalis**, L.—In the pond below the house. Not common on either visit.
- L. peregra**, Müll.—In pond, marsh, and stream.
- L. palustris**, Müll.—A few in the pond below the house, and in pools beside the Dodder just outside the marsh.
- L. truncatula**, Müll.—By no means as common as one would expect at the marsh. It is, however, easily overlooked.
- Physa fontinalis**, L.—Common with *Planorbis albus*, Water-fleas, and large Ostracoda among Water Starwort (*Callitriche*) in the marsh; rare in the pond.
- Aplexa hypnorum**, L.—Swarming, but very local in the marsh. We did not see here *Planorbis spirorbis*, which we find so often associated with this species.
- Planorbis carinatus**, Müll.—Nice specimens, rather more typical of the text-book shell than many Irish forms referred to this species.
- P. spirorbis**, L.—Two or three dead shells only found in the pond and at the marsh.
- P. contortus**, L.—With the next species in the marsh.
- P. albus**, L.—Abundant, see *Physa* above.
- P. fontanus**, Lightf.—This rare species was found only very sparingly in the pond below the house.
- Ancylus lacustris**, L.—Also rare in the pond.
- Bythinia tentaculata**, L.—Common in the pond.
- Valvata piscinalis**, Müll.—In the pond only, rare.
- Sphærium corneum**, L.—Not uncommon in the pond.
- S. lacustre**, Müll.—Seems rare; a few found in the pond only.
- Placidium fontinale**, C. Pfr.—Lives in profusion in parts of the marsh; under stones in a few inches of water, we found from forty to eighty specimens.
- P. millum**, Held.—Common at the roots of small water plants.
- P. pusillum**, Gmel.—With the last species in the marsh, but neither so plentiful as *P. fontinale*.

Though this list contains 62 species, as large a number as the Kerry Conference list of 1898 (*I.N.*, vol. viii, p. 218), yet we do not believe that it by any means exhausts the list of Bushy Park mollusca. Conchologists will miss such species as *Limax marginatus*, *Helix rupestris*, and *H. aculeata*, which we feel sure will reward future search; and as there are also most suitable habitats for *Helix fusca* and *Acme lineata*, they may also occur. In such an old garden, too, one or more of

the carnivorous Testacellæ, which live underground, may be found, as they have been in other Dublin gardens.

Sixteen of the species noted are absent from the Co. Dublin column in the last census of the Conchological Society, 1902. The revised nomenclature of the land and fresh-water mollusca being still under consideration by that Society, we adopt that used by its President (Dr. R. F. Scharff) in his Irish list, vol. i. of this Journal. We have to thank Dr. Scharff, and also Messrs. R. Standen and C. Oldham for verifying some troublesome *Hyaliniæ* and *Pisidia*.

Belfast.

THE TEETH IN MESOPLODON HECTORI.

BY PROFESSOR RICHARD JOHN ANDERSON, M.D., M.A.

A SKULL of this cetacean came to our Museum from the Aran Islands some months ago. The length is three feet five inches, and greatest breadth twenty-eight inches. The entire length of the animal was stated to have been twenty-one feet.

The skull of the specimen described in this Journal on a former occasion was much smaller, viz., $26\frac{1}{2}$ inches long by $13\frac{1}{2}$ wide.

No trace of any teeth was seen before removing the mucous membrane. On removal, however, of this membrane and the submucous tissue, two conical teeth were found deeply imbedded beneath the tissue investing the lower jaw in front, and were contained in large and wide sockets. Three-eighths of an inch of each tooth appears above the cavity in each case. Each socket is convex externally, and flattish, or at least less convex, internally.

Each tooth is doubly conical; the two cones are united base to base, the lower being a truncated cone; in the narrow end of the latter is the opening of the pulp cavity, which is one-eighth of an inch deep. The tooth is flat from side to side and 5 mm. broad at the thickest part and more convex on the outer side. The teeth lie in a loose packing tissue which fills each socket between the tooth and the bone. It is

suggested that these large teeth situated close to the symphysis of the lower jaw in front can be partially extruded from the socket whilst still lying beneath the mucous membrane.

A covering of enamel was clearly distinguishable on one tooth.

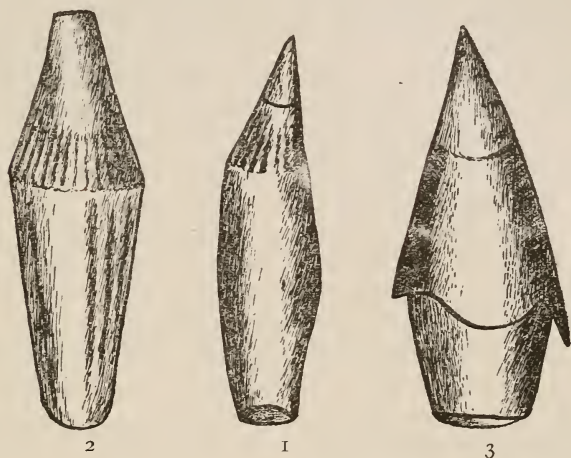


Fig. 1. Tooth of *Mesoplodon Hectori*.
,, 2 Tooth of *Ichthyosaurus (Lias.)*
,, 3. Tooth of *Mosasaurus (Chalk.)*

The length of each tooth is 52 mm., and its greatest breadth 5 mm., whilst the sockets are each $1\frac{5}{8}$ inches deep, and the left one has a diameter of 20 mm. at the base from before backwards, and 15 mm. from side to side.

The tooth is here figured side by side with the tooth of an *Ichthyosaurus* and that of an *Mosasaurus*.

Queen's College, Galway.

SOME KERRY RUBI.

BY REGINALD W. SCULLY, F.L.S.

IN the following list are embodied the results of a good deal of attention given last summer to the *Rubi* growing within a radius of about seventeen miles from Killarney as centre. Even allowing for the fact that this area includes the best *Rubus* ground in the county, the results show that Kerry is probably as rich in the forms of this group as any county in Ireland. Several very promising districts were left quite untouched, so that the list is by no means a complete one, even for the limited area referred to. As will be seen below, several forms new to Ireland were gathered, while a fairly large number of new district and vice-county records were made. The Rev. W. Moyle Rogers, whose kindness in looking over the whole of the rather bulky gatherings I desire gratefully to acknowledge, seemed especially interested in the discovery in Kerry of his *R. Briggsianus*, a well marked and handsome bramble, which was gathered in several localities, and seems to be quite frequent in the county. A number of other gatherings have been left over for further material or observation. Some of these may be hybrids; others are perhaps new and undescribed forms. In some of my earlier trips I had the advantage of the Rev. E. S. Marshall's help, and in the list which follows, plants collected by us when working together, are distinguished by the initials M.S.; records without initials are my own.

Additions to District I. of "Cybele Hibernica," 2nd edition, are, as usual, indicated by "I."; those followed by "1" or "2" are additions to the Kerry sub-divisions of "Irish Topographical Botany."

- R. suberectus**, Anders.—I. 1. Rocky islets in the Caragh River, just below Blackstones bridge; rocky shore of Caragh Lake, below the Southern Hotel.
- R. pilcatus**, Wh. & N.—1. Frequent about Lickeen and other places in the Glencar valley. Abundant in several places around the shores of the Lower Lake, Killarney, such as swamp near the mouth of the River Deenagh; M.S.; north side of Ross bay, &c.
- R. nitidus**, Wh. & N., sub-sp. **opacus**, Focke.—I. 1. Stony island in the River Sheen, near Dromanassig bridge, south of Kenmare.

- R. affinis**, Wh. & N., var. **Briggsianus**.—I. 1, 2. Roadside ditch on the south side of Kenmare estuary, east of the Sheen falls; wet thickets on Ross Island, Killarney; north bank of the River Laune below Ballymalis Castle. This handsome bramble does not appear to have been previously recorded for Ireland.
- [*R. integrifolius*, P. J. Muell.—I. 2. Woodlawn wood near Killarney; M.S. "Strongly recalls the English plant."—W. M. R. If confirmed, this would also be new to Ireland.]
- R. cariensis**, Rip. & Genev.—I. 2. Near Glenna cottage, Lower Lake Killarney; M.S.
- R. pulcherrimus**, Neum.—This seems a common bramble in Kerry; new localities are—Kenmare, Glenbehy, Farranfore, &c.; M.S. Glencar valley and several places about Killarney.
- R. Selmeri**, Lindeb.—I. Kenmare, and frequent about Dooaghs, east of Glenbehy; M.S. Several localities about Killarney.
- R. rhombifolius**, Weihe.—I. 1, 2. By the Caragh River, Glencar: on Ross Island, and in the Deer-park glen, Killarney.
- [*R. ramosus*, Briggs.—I. 1. Roadside in Glencar valley, and in a wood at the south-east end of Caragh Lake. Only provisionally so named, but if confirmed, will be a new Irish record.]
- R. argentatus**, P. J. Muell.—Hedge in Woodlawn lane, near Killarney; M.S. Var. **robustus**, P. J. Muell.—I. 1. Near Kenmare; M.S.
- R. macrophyllus**, Wh. & N.—Near Kenmare; M.S. "An abnormally strong form."—W. M. R. Sub-sp. **Schlectendallii** (Weihe).—Woodlawn lane; M.S., and several other localities about Killarney. Var. **macrophylloides** (Genev.).—I. 2. Near Glenna cottage, Lower Lake, Killarney; M.S. First Irish record for this variety.
- R. micans**, Gren. and Godr.—I. 1, 2. Wood at the south-east end of Caragh Lake, and on Ross Island, Killarney.
- [*R. hirtifolius*, Muell. & Wirt., var. *danicus*, Focke.—I. 2. This form is thought, by the Rev. E. S. Marshall, to be rather frequent in the district we examined; unfortunately, there is only one gathering, which is doubtfully referred to this form by Mr. Moyle Rogers, from Woodlawn lane, Killarney.]
- R. irlicus**, Rogers.—2. Frequent, as at Kenmare, Glencar valley, and several localities about Killarney; M.S.
- R. pyramidalis**, Kalt.—2. Kenmare, and several localities about Killarney and the Upper Lake; M.S.
- [*R. adenanthus*, Boul. & Gill.—I. 1. Stony bed of the River Sheen at Dromanassig bridge, south of Kenmare. Of this plant, which has not yet been definitely recorded from Ireland, Mr. Moyle Rogers writes—"It seems impossible to separate this from my Gorey bay (Jersey) plant, which Focke named *R. adenanthus* without qualification of any kind. Your plant seems only slightly weaker in stem. . . . I am naming Hereford and Cheshire plants in the same way."]
- R. mucronatus**, Blox.—I. 1. Near Kenmare; M. S.

- Rubus anglosaxonicus**, Gelert.—I. 2. Rocky roadside near the Upper Lake, Killarney.
- R. raduloides**, Rogers.—I. 1. Near Kenmare; M.S. Not previously recorded from Ireland.
- R. regillus**, A. Ley.—I. 1, 2. Wood at the south-east end of Caragh Lake. On Ronayne's Island, Upper Lake, Killarney; M.S.
- R. podophyllus**, P. J. Muell.—I. 2. Shores of Castletough bay, Lower Lake, Killarney. This does not seem to have been previously recorded for Ireland.
- R. Babingtonii**, Bell-Salt.—I. 1. Near Kenmare; M.S.
- [*R. Lejeunii*, Wh. & N., var. *ericetorum*, Lefv.—I. 1. Near Kenmare; M.S. "I doubt very much whether this can be separated from *ericetorum*."—W. M. R. If the provisional naming be confirmed, this will be new to Ireland.]
- R. fuscus**, Wh. & N.—I. 2. Near Glenna cottage, Lower Lake, Killarney; M.S.
- [*R. plinthostylus*, Genev.—I. 2. Woodlawn Lane and wood, near Killarney; M.S. "Strongly recalls the Dorset plant, and may go under that species provisionally."—W. M. R. New to Ireland, if confirmed.
- R. Bellardii**, Wh. & N. (*forma*).—I. 2. Coltsmann's wood, by the River Flesk, Killarney. A form which seems new to Ireland.
- R. serpens**, Weihe (*forma*).—I. 2. Woodlawn, near Killarney; M.S. This also seems new to Ireland.
- R. corylifolius**, Smith, sp. coll., var.—I. 2. Victoria bay, Lower Lake, Killarney. Var. **sublustris** (Lees).—I. 2. Sandy shore of Castletough bay, Lower Lake, Killarney.
- R. pulcherrimus** × **rusticanus**.—In Kenmare park, with the parents; M.S.

Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Ground Squirrel from Capt. Cowan, a Long-tailed Glossy Starling from Mr. H. B. Rathborne, two Jays from Mr. H. C. Cary, a Golden-eye Duck, a Mallard, and two Finches from Mrs. Ross Maghery, two Brazilian Parrakeets from Mr. D. S. Morse, nine Redpolls and two Goldfinches from Mr. W. W. Despard. A Pigmy Calf, a St. Kilda lamb, a Barbary lamb, and a Black-striped Wallaby have been born in the Gardens. A young Dromedary has arrived from Rotterdam. The Elephant, Padmahati, is now available for the carriage of visitors to the Gardens.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

APRIL 26.—W. SWANSTON, F.G.S., in the chair. There was a large attendance both of the members of the Philosophical Society and the Naturalists' Field Club. At the beginning of the proceedings a presentation was made, by the joint Societies, to S. A. STEWART, F.B.S.Edin., on the occasion of his election as Associate of the Linnean Society. Mr. Stewart has for over fifty years been engaged in studying the botany and zoology of Ulster, and his works on these subjects occupy to-day the position of classics. For a long period he has acted as curator of the Belfast Museum, College-square North, and under his care the institution has progressed wonderfully.

After complimentary speeches by the Chairman and W. J. FENNELL, President of the Naturalists' Field Club, the following address, which had been illuminated by Mr. J. Vinycomb, was read by R. M. Young:—

"We, the President and Members of the Natural History and Philosophical Society, and the President and Members of the Belfast Naturalists' Field Club, desire to place on record the high sense of satisfaction with which we have learned that you have been elected an Associate of the Linnean Society as a recognition of your long and valuable services in botanical research, and we desire to congratulate you most heartily on it; and we trust that you may be long spared to wear your well-won honours, and to pursue the studies that have brought you such distinction."

Mrs. FENNELL, amidst applause, then presented Mr. Stewart with a purse of sovereigns.

S. A. STEWART, in responding, said it was with feelings of the utmost gratification that he received that complimentary address and its valuable gift. His sense of its value was enhanced by the fact that it came from the officers and members of the two societies which cultivated natural science in Belfast and the North of Ireland. His election as Associate of the Linnean Society came as a surprise, and he could honestly say that it was the most prized of all the honours possible to him. He felt that his work had, to a great extent, now been done. Tate, Robinson, and many others who helped it forward, and who were instrumental in establishing their Field Club, had gone. They had followed Drummoud, Patterson, Templeton, Thompson, and many old-time worthies of the Natural History Society. The associations which they founded, however, remained, and new workers had come and were coming forward. He wished those workers every success, and hoped that in nature studies they would enjoy the same pleasures as had rewarded him.

Complimentary speeches were delivered by JOHN BROWN, F.R.S.; W. GRAY, and JOSEPH WRIGHT, F.G.S.

JOHN BROWN, F.R.S., read a paper on "The National Expenditure on the Maintenance of Gulls." He referred to the destruction of herrings by these birds, and, taking for his basis the hypothesis that each gull ate 200 fry in one day, it would, in the two months of which its play-time lasted, said Mr. Brown, dispose of 12,000 fry. On the assumption that if left alone these baby herrings would all have matured, and that the average price of herrings on the pier is about £1 per 1,000, the keep of each gull for two months cost the nation £12. In the "play" of the gulls, which the speaker described, there would be about 100 birds engaged, and, supposing there were five "plays" per mile of coast, taking the coasts of the three kingdoms and adjacent islands, but omitting the smaller inlets, at 4,000 miles, they got a total of two million birds, whose keep for two months in herrings would cost twenty-four millions sterling!! They could hardly hope to extirpate these predatory birds, but if the State were to give a halfpenny per head for those destroyed, their number might at least be reduced. He quite appreciated all that was said in the birds' favour, just as he appreciated the glistening gracefulness of the snake or the striped beauty of the tiger, but against this he had to take into consideration the great amount of mischief which they wrought.

Professor GREGG WILSON said if the herrings were allowed to increase unchecked, the sea would not be able to contain them, and, though he would prefer that they should be eaten by more useful birds than gulls, he was of opinion that gulls did not do nearly so much damage as might appear at first sight.

Professor FITZGERALD, and Messrs. GRAY, HAMILTON, and FENNELL spoke to the paper. Mr. BROWN having replied to the discussion,

The HON. SECRETARY read the paper prepared by J. M'KEAN on "Blinking, or Ill-wishing," in the absence of the author.

Professor GREGG WILSON, who was a delegate to the meeting of the British Association last year, then gave an account of the business transacted there.

BELFAST NATURALISTS' FIELD CLUB.

APRIL 19.—Annual general meeting. The President, W. J. FENNELL, M.R.I.A.I., in the chair; there was a large attendance of members.

NEVIN H. FOSTER read the annual report, which stated that the membership, which last year stood at 312, now numbered 353. Fifty-three new members were elected during the year, while 12 names had been removed from the list through death or other causes. Details of the past summer's excursions having been given, thanks were returned to Lady Dunleath, Mr. James Bruce, D.L., and the Rev. Michael Quinn for facilities granted to members of the Club; and to the President and Mrs. Fennell for having entertained so hospitably at Ballywalter. The

library was satisfactorily furnished, and it was hoped that the members would avail themselves of the facilities it afforded for scientific study. On the occasion of the King's visit an address was presented to his Majesty and a gracious reply accorded. The meagre equipment afforded in Queen's College, Belfast, for biological study and research warranted the Committee in submitting to the authorities a statement drawing attention to the imperative necessity for further provision in this respect. Notwithstanding, however, the crying necessity, as pointed out by the Committee and other learned societies, the Government, oblivious of past promises, refused to supply the wants of the local college.

The report of the Botanical Section, was next read. The work was going on satisfactorily, although the weather in 1903 was unfavourable.

The Chairman read the report of the Geological Section, which stated that the members had set to work with renewed vigour. Various excursions were described, these having proved a remarkable success. Thanks were expressed to James Orr and G. C. Gough for the trouble they had taken in making the excursions interesting and instructive.

The Librarian's report was also presented, as well as that of the Prize Sub-committee. The treasurer's report showed a credit balance of £42 *or*. 6*d*.

The Chairman, in moving the adoption of the annual report and statement of accounts, said when they were published it would be agreed that they were amongst the best they had yet received. They had a library which any scientist might visit with pleasure. The report of the Prize Committee was not so encouraging as it might have been, because the competitions were not so numerous as they could desire. He trusted that in the coming year there would be keener interest displayed. He also thought that some of the members might assist the Club by offering prizes in various departments.

Dr. ST. CLAIR BOYD, in seconding the resolution, said he had recently visited Egypt, and had there collected a number of views and copious notes, from which he would be glad to deliver a lecture.

WM. GRAY said the Club had had a successful year, and he heartily supported the resolution. The reports were passed. W. J. Fennell was appointed president for the coming year; Robert Patterson, vice-president; W. H. Phillips, treasurer; George Donaldson, librarian; Nevin H. Foster and James Orr were appointed honorary secretaries.

The Chairman proposed a hearty vote of thanks to Mr. Patterson. They were all grateful to him for the splendid services he had rendered to the Club, and to him and Mr. Foster they were deeply grateful. The resolution was passed amid applause.

The following members of committee were next elected:—Messrs. George C. Gough, Alexander Milligan, H. Lamont Orr, George E. Reilly, Robert Welch, Professor Gregg Wilson, Joseph Wright, Robert Bell, W. H. Gallway, and W. A. Green.

WM. GRAY proposed that it be an instruction to the new Committee that they should immediately put themselves in communication with the City Council, and suggest to them the desirability of properly

arranging, classifying, and naming the Grainger collection, with the view of developing its educational character.

J. M. DICKSON seconded the motion. The collection was almost valueless from an instructive standpoint, as Irish antiquities were mixed with South Sea Island exhibits, while geological specimens were side by side with old flint heads. The collection would be valuable if properly classified.

The resolution was passed unanimously.

Robert WELCH then showed a number of very interesting limelight views of scenery at Sligo and its neighbourhood, where the Club will enjoy their long excursion in July.

DUBLIN MICROSCOPICAL CLUB.

MARCH 9.—The Club met at Leinster House.

J. N. HALBERT showed some caddis cases of peculiar construction, with larvæ, found in the River Tolka. The cases are small, measuring only 4 millimetres in length. They are oval in shape and laterally compressed, formed of two valves of finely spun material, joined together along the edges, but open in front. The larvæ were fairly active when undisturbed. The cases closely resemble those made by species of *Hydroptila*.

WILLOUGHBY DADE showed living specimens of freshwater Polyzoa.

APRIL, 13.—The Club met at Leinster House.

J. N. HALBERT showed *Mideopsis orbicularis*, Muller, a rather local species of water-mite from Lough Derevaragh.

G. H. CARPENTER showed specimens of *Neanura citronella*, a new species of Springtail from the Sandwich Islands, recently described and figured by exhibitor in vol. iii. of the "Fauna Hawaiiensis." The maxillæ, dissected out of the head, were demonstrated under a high power.

MAY 10.—The Club met at Leinster House. Dr. J. A. SCOTT, President, in the chair. Officers for the session 1904-5 were elected as follows:—President, R. F. Scharff, Ph.D.; Vice-president, Geo. H. Carpenter, B.Sc.; Hon. Treasurer, W. N. Allen; Hon. Secretary, F. W. Moore, A.L.S. Dr. Scharff, the newly-elected president, having taken the chair,

Dr. M'ARDLE exhibited *Sphærocarpus terrestris*, Mich., which was collected by Mr. W. H. Burnell in Norfolk where it occurs in considerable quantity near the sea shore, and also 6 to 12 miles inland, in clover and turnip fields. It is one of the most remarkable of the frondose liverworts; the lobes of the frond are concealed by the aggregate inflated perianths, which are sessile and pyriform, and the plants grow in crowded patches. The capsule is very delicate in structure, crowned with a

deciduous style, bursts irregularly, and is composed of a single layer of cells; this was partially removed from the specimens exhibited, exposing the dark coloured muriculate spores.

The rediscovery of this rare liverwort in Ireland would be of great interest, it having been found many years ago on a wet clay bank at Collin glen near Belfast by Mr. David Orr, an excellent bryologist. Dr. D. Moore in his work on Irish Hepaticæ writes "I have never seen any Irish specimens of this plant, nor have I heard of it having been observed by any other person than Mr. Orr in Ireland."

In the "List of the Irish Hepaticæ," (*Proc. R. I. Acad.*, Vol. xxiv., Section B., p. 496), the exhibitor appended the following note regarding this plant:—

"Stubble fields and similar places have been neglected by collectors, and there is no reason why the plant should not be rediscovered." The specimens exhibited were kindly sent by Canon Lett.

G. H. CARPENTER showed a new species of *Nymphon*, collected by Prof. Herdman on the pearl banks of the Gulf of Manaar, and remarkable from the comparatively great length of the abdomen and the regular arrangement of pigment on the trunk. A cheliforus and the terminal segments of an ovigerous leg with denterulate spines were demonstrated under the microscope.

DUBLIN NATURALISTS' FIELD CLUB.

APRIL 26.—The closing evening meeting of the session was held, GEO. H. CARPENTER, B.Sc., in the chair. An account of the Sligo district to be visited by the Club on the occasion of the Field Club Union Conference in July, was given by various naturalists. Prof. G. A. J. COLE, F.G.S., described the geology and scenery of the district, pointing out the different types of landscape to be met with in the Carboniferous limestone highlands on the one hand, and the older granitoid hills on the other. J. N. HALBERT followed with an account of the fauna of the district, calling attention to the probable presence of many alpine animals. R. LL. PRAEGER, B.A., gave an account of the botany, laying special stress on the alpine plants of the Ben Bulbin range, after which he briefly sketched the probable programme of the excursions. R. WELCH showed some beautiful views of antiquarian subjects. Miss J. Stephens, B.Sc., and the Hon. R. E. Dillon were elected into the Club.

APRIL 30.—EXCURSION TO RUSH BULB-FARM—Fifty-one members and friends travelled from Dublin to Rush by the 1.45 train on a visit to Messrs. Hogg and Robertson's farms. The party was under the guidance of D. Houston, F.L.S. After having inspected the daffodils, the members proceeded to the tulip section where a very brilliant display was seen. The party returned to town at 7 o'clock.

MAY 14.—EXCURSION TO CHAIR OF KILDARE.—Fifteen members and friends left Dublin by the 12.30 train on a geological excursion to the Kildare inlier. T. CROOK, A.R.C.S.I., acted as conductor. Cars were taken at Kildare Station, and the party drove three miles to the northward to the foot of Grange Hill, on the southern slope of which stands the Chair of Kildare.

The Chair of Kildare is a mass of limestone, some three miles N. of the town of Kildare, and forms part of a hilly ridge, running in a N.E. and S.W. direction. This ridge is six or seven miles long, and has an average width of about three-quarters of a mile. The rocks of which it is composed are partly sedimentary and partly volcanic, all of Silurian age, and are overlaid unconformably on all sides by the Carboniferous limestone of the plain. The four hills form striking features in the district; they were probably at one time covered by Carboniferous rocks, and they owe their present relief to the fact that they are made up largely of hard basaltic and gritty rocks, in consequence of which they have been able to resist the weathering forces which have stripped off their Carboniferous flanks with comparative ease.

The party then ascended Grange Hill, passing at different levels the various kinds of rocks which form the hill. Fine specimens of volcanic ash, andesite, and porphyritic basalts were obtained, and finally at the Bala limestone, which forms the Chair of Kildare, the members obtained many characteristic Silurian fossils. At this point a business meeting was held, Dr. Connolly Norman presiding, at which Miss Foster was elected a member. The party then walked back to Kildare, and after tea returned to Dublin.

CORK NATURALISTS' FIELD CLUB.

APRIL, 20.—ANNUAL MEETING.—THOMAS FARRINGTON, M.A., in the chair. The report was submitted by the Hon. Secretary, and adopted, together with the Treasurer's statement, showing a balance in hand of about £6.

The membership of the Club now stands at 58, including 11 hon. members, as compared with 67 last year. Owing to the Cork Exhibition running a second year, it was again decided not to hold any excursions. The Club was able, thanks to contributions from several members, to have a section in the Exhibition, which created a good deal of interest. The Secretary interviewed Colonel Plunkett, Director of the Science and Art Museum, Dublin, and through his kindness obtained a representative collection of Irish butterflies, moths, and beetles, which were lent to the Club. These were supplemented by collections of birds from Sir John C. Neligan, K.C., and Mr. F. R. Rolu; botanical exhibits from Miss H. A. Martin, and Messrs. R. Lloyd Praeger and R. A. Phillips; insects from Messrs. W. H. Johnson, J. L. Copeman, and J. J. Wolfe;

shells from Messrs. R. A. Phillips and J. L. Copeman; and marine animals from Miss M. Delap, Valencia Island. The Club's section was thus very complete, and excited a great deal of attention.

The Secretary also had the pleasure of being able to organise a special section of nature study exhibits, sent from some 130 schools from all parts of the United Kingdom, of which Miss Martin worked up the kindergarten section. This was the first nature study exhibition held in Ireland, and created great interest, forming one of the prominent features of the exhibition; and its effect should be to induce in schools in Ireland the study of nature, which has now a recognised place in most schools in Great Britain. The exhibits from Dublin are now under the care of the Club, as well as several others, and a very valuable series of maps and scientific diagrams presented by several publishers, to form the nucleus of a museum; and it is hoped this will be the outcome of the exhibition, and find its home in the Shrubberies' House, which seems its proper place.

The officers were re-elected as follows:—President, Prof. Hartog, D.Sc. Vice-Presidents, Messrs. T. Farrington, M.A.; J. L. Copeman, R. A. Phillips, J. H. Bennett, H. H. Lund, and Miss Martin. Hon. Treasurer, Mr. W. B. Lacy. Curator, Mr. W. H. Johnson. Hon. Secretary, Mr. J. L. Copeman; together with Committee, Messrs. F. R. Rohu, J. Noonan, W. Miller, Prof. J. Taylor, and Mrs. E. Brooke Hughes.

The following new rule was revised and confirmed:—"Juniors (age under 20 years), children of members, or introduced by a member, shall be admitted to membership, with the privilege of attending all lectures and excursions, on payment of an annual subscription of one shilling."

The programme of the summer excursions was then discussed and adopted.

APRIL 23.—A large party, numbering 29, and including many of the recently formed junior branch, visited Lotamore, by kind permission of A. F. Sharman-Crawford, Esq., and after an enjoyable time spent in the woods, which were gay with Blue-bells and Anemones, walked home by Bennett's Bog. On the way a lecture on geology was given by Mr. Farrington, a stream illustrating well the action of water in cutting river-beds.

The following plants were noted by Mr. Phillips:—*Hypericum hircinum*, abundant in its old known Irish station; *Arenaria trinervia*, *Euphorbia hiberna*, *Luzula pilosa*, *Carex pendula*.

MAY 7.—A party of 16 walked through Waterfall Glen to Ballincollig, where tea was served, and the train taken for home. The slopes of the glen were resplendent with the Gorse, but nothing very special was noted. *Senecio squalidus* was seen on the railway bank at Ballincollig.

NOTES.

BOTANY.

Note on some Seaweeds occurring on the Antrim Coast.

During the summer of 1903 a large quantity of material was collected at various points on the Antrim coast. Of this it has been possible to examine, so far, only a small portion, and the following note refers to the distribution of some of the less known species. The most important works containing references to the distribution of the marine flora of Antrim, are the "British Association Guide to Belfast" for 1874, and the second edition, 1902, and Batters's "Catalogue of British Marine Algæ," 1902.

Codium tomentosum, Stackh.—None of the three lists quoted above mention this species as occurring on the Antrim coast. It was found in rock-pools between tide marks at Blackcave Tunnel, at Cushendall, Ballycastle, and Portrush, and is doubtless generally distributed.

Chaetomorpha Melagonium, Kütz. (*Conferva Melagonium*, Web. and Mohr.), occurs about low-water mark at Portrush, and at various other places round the Antrim coast.

Halurus equisetifolius, Kütz. (*Griffithsia equisetifolia*, Ag.).—This elegant Red Seaweed was found on 25th August, a little below low-water mark, at Portrush. None of the specimens showed reproductive organs. The only Irish localities in Batters's list are the coasts of Wicklow, Cork, and Clare.

J. ADAMS.

Royal College of Science, Dublin.

ZOOLOGY.

Lizards in Ireland.

I lived for many years in the Suir valley, and very rarely saw a lizard there; during the last four years I have lived on a range of hills 500 feet over the Suir valley and have seen many lizards on the hills (although I am away most of each day at business in town). Your reviewer's remark (p. 61) appears not to apply to this district, and Dr. Leighton's observation that the Common Lizard prefers hilly parts applies here.

J. ERNEST GRUBB.

Carrick-on-Suir.

Gadwall at Londonderry.

On 4th January Mr. W. S. Taylor shot an immature female Gadwall (*Anas strepera* L.) on the shore of Lough Foyle. Mr. Robert Patterson kindly identified it.

D. C. CAMPBELL.

Londonderry.

Spring Rivalry of Birds.

Mr. C. B. Moffat's able article on above subject in the *Irish Naturalist* for June, 1903, was most interesting, especially as regards his views of the country being "parcelled out," as it were, to certain pairs of birds of each species, and that the possession of each plot was contested for by the males, the victor in the combat taking occupation of the site. The following observations help, I think, in a way to confirm this theory. On the last day of April this year, whilst trout fishing on the Glenwherry River, Co. Antrim, my attention was called to a pair of Common Sandpipers (*Totanus hypoleucus*) seemingly engaged in mortal combat; with wings expanded and held erect, they were flopping about and tumbling over each other on a small rush-covered reach of the river. I stopped fishing and turned my glasses on the scene, and by so doing I was enabled to see another Sandpiper, probably a female, crouching amongst some stones, and seemingly an interested spectator of what was going on. These two birds were, I presumed, males, and the thought struck me that they were either fighting for this particular reach of the river as a probable nesting site, or for the female as a mate.

The combat lasted fully a quarter of an hour, partly on the shore and partly in the water. During the whole time the wings were held erect and expanded to the full extent, and the well-known piping cry was uttered. It ended in the vanquished bird being carried down by the stream past the spot where I was lying, and washed against some stones in the centre of the river, where it was just able to crawl out, a pitiable sight, its head bleeding freely from just under the eye. It recovered rapidly, as it shortly took wing and flitted down stream to a small islet, where it was joined by another bird of the same species. The victor, evidently well pleased with himself, now turned his attention to the female, and went through a wonderful series of love antics before her, as if saying, "I have beaten that fellow off, and by doing so have secured you as my lawful wife and this piece of ground for ourselves." I fancy the nesting site had been selected, as I noticed the female going to a clump of rushes and crouching amongst them during the time the fight was going on. Now, were these two birds fighting for this particular spot on the river (a most likely spot for this species to nest on), or was it for the possession of the female as a mate—or for both? It may have been for one or the other; on the other hand, it may have been for both, the female having probably selected the nesting site, and the two male birds having decided by a regular stand-up fight which was to become the happy possessor of both, the vanquished one giving up all claims on the lady and the plot of ground.

Both objects would thus have been attained at the one time, as both the female and nesting site selected would have been secured.

W. C. WRIGHT.

Marlborough Park, Belfast.

Nesting Boxes for Birds.

We are glad to note that birds' nesting-boxes are now made by the Ballycastle Toy Industry, County Antrim, so that Irish naturalists can obtain them at home. They are made in all the usual sizes and shapes, but special requirements can be met, and all prices given on application to the manager. Many samples can be seen at the residence of Robert Patterson, Holywood, and F. J. Bigger, Ardrie, Belfast.

NEWS GLEANINGS.

S. A. Stewart, A.L.S.

The well-deserved address and presentation to our veteran colleague by the Belfast Societies will be found recorded on another page. We are glad to see that the value of Stewart's work has been recognised by the Belfast Press, and we quote with pleasure a few lines from the appreciative notice of his career in the *Evening Telegraph* of April 26:—

"This evening, in the Belfast Museum, there will be honoured a citizen who has done more to bring credit and distinction to Belfast than many of her 'merchant princes.' Mr. Samuel Alexander Stewart is one of those men who place the advancement of human knowledge, and the pursuit of science for its own sake, far above the mere accumulation of money and consequent social influence. To the thoughtful man it is one of the most distressing signs of modern life that esteem, popularity, and worth depend altogether upon one's banking account. Given a large income, and, no matter how poor the intellect, the owner becomes at once an important, popular, 'run-after,' and influential person. On the other hand, a man of the highest intellectual power, who works single-mindedly for art, science, or literature, one whom the great minds of the world would be proud to know, is neglected and looked down upon as being a faddist, if he does not possess an abundance of this world's goods. And yet such men will be remembered and honoured after the money-makers have sunk into oblivion. Mr. S. A. Stewart, for nearly fifty years, has been engaged in quiet investigations into the botany and geology of the North of Ireland, which, although they are not of the nature to attract the attention of the 'man in the street,' have brought fame and distinction to himself. Mr. Stewart cares not for fame; he is actuated only by an absorbing love of nature, and a desire to add to the sum of human knowledge."

ROUND ABOUT LAKE BELFAST.¹

BY R. LLOYD PRAEGER.

THE second map of the Drift Survey of Ireland has been published, and with it a new descriptive Memoir, dealing with both the solid and surface geology. In the case of the Dublin map, issued last year, that city lay well in the middle of one of the sheets of the one-inch ordnance map (sheet 112), and the edges of the sheet provided convenient boundaries for the field-work. Here, on the other hand, the city of Belfast lies close to the intersection of the edges of four sheets, consequently a map has been adopted of the usual size of a one-inch sheet, but having Belfast placed nearly centrally upon it. The area thus included extends roughly from Lisburn to Bangor, and from Ardmillan to Clady. Thus about two-thirds of the map belongs to Down, one-third to Antrim. The map is excellently turned out, and with the marvellously accurate register for which the Southampton office is justly noted. We at once notice a difference in the colour-printing as compared with the Dublin map. The latter was printed at the Dublin Ordnance Survey office by the three-colour process, whereas in this Southampton-printed sheet the old separate-colour process of chromo-lithography has been reverted to, requiring no less than nineteen consecutive printings. While admiring the beauty and effectiveness of the map, we feel a lingering regret that it is not, like its predecessor, "made in Ireland." The scheme of colours is similar to, but not identical with, that which has been used on the maps of the English Drift Survey, a series of strong colours being used for the solid

¹ **Memols of the Geological Survey, Ireland. The Geology of the Country around Belfast.** (Explanation of the Belfast colour-printed Drift Map). By G. W. LAMPLUGH, F.G.S., J. R. KILROE, A. M'HENRY, M.R.I.A.; H. J. SEYMOUR, B.A., F.G.S.; W. B. WRIGHT, B.A.; and H. B. MUFF, B.A., F.G.S. Pp. vi. + 166. Five plates and 16 figures in text. 8vo. Dublin: H.M.S.O., 1904. Price—Three Shillings. And Map entitled—**Belfast District. (Drift Series).** 18" x 12". Printed in 19 colours. 1s. 6d. Southampton: Ordnance Survey Office, 1904.

geology, and a range of pale tints for the superficial deposits. We note that the solid geology colours are not always quite the same as those employed by the Survey for the same rocks in the well-known one-inch geological maps of Ireland, nor are the drift colours identical with those of the Dublin sheet issued last year. An excellent and illuminating novelty is supplied in the shape of two selected horizontal sections drawn on the lower margin of the map—the one across the Lagan valley from the basaltic escarpment to the Silurians, the other across the Silurian uplands from the Permian outcrop at Cultra to the patch of Carboniferous limestone at Castle Espie.

In the Memoir, too, we note some differences as compared with that of the Dublin district, which are certainly also improvements. Untrammelled by the existence of a previous Memoir relating to precisely the same area, which required to be practically reproduced, a general description of the geology of the district, solid and drift, is first given, occupying 65 pages. Here the general reader, and the geologist wishing to obtain a broad conception of the geological features around Belfast, is provided with an excellent descriptive account, clear and concise, with references to the more important literature. Following on this, as Part II., comes the detailed description of the drifts, occupying 55 pages. Thereafter succeed short chapters on economic geology, petrology, and mineralogy, deep well-sections, and bibliography. This getting together of the general description is distinctly a convenience, for, while the high value of the detailed account and its mass of information is beyond question, it appeals to a different audience than that for whom the general account will suffice—namely, to the scientific or the industrial man who is actually at work in the district. While each section of the detailed description is initialed by the officer responsible for it, this general description, occupying nearly half the Memoir, is unsigned, but the Preface tells us that the somewhat unenviable task of abridging the account of all the rocks of the district from the existing Memoirs, and bringing it up to date, without any opportunity of fresh study of the solid geology, has fallen on Mr. Lamplugh. A good deal has been published concerning the district since the appearance in 1871-76 of the three Memoirs which deal in part with the area

under consideration. Swanston and Lapworth, and subsequently the Survey officers, have elucidated the Silurian series. Hume has produced an important paper on the Chalk. Starkie Gardner and Sir A. Geikie have thrown much light on the volcanic series: and S. A. Stewart, Joseph Wright and others have worked out the fauna of the Glacial and Post-glacial beds. All this work is duly referred to, and its results assimilated in the ‘General Description.’

The district is one which has always charmed the geologist, on account of the great variety of rocks displayed—folded Silurian slates, patches of Carboniferous and Permian rocks, Bunter, Keuper, Rhaetic, Lias, Greensand, and Chalk peeping out from under the Eocene basalts, the largest lava-sheet in the British Isles; Glacial clays and sands, and a varied series of Post-glacial beds. The surface-configuration, too, is such as may well supply interesting studies to the glacial geologist.

As regards the origin of the drift which is spread over the greater part of the Belfast area, an opinion is expressed with no uncertain voice:—“The boulder-clay is probably the direct product of land-ice” (p. 49). The present writer is proud to admit that for many years he followed the little band of Belfast workers who have so stoutly advocated a great Glacial submergence. But—it is no doubt the enervating effect of a Dublin atmosphere—he now confesses to a sympathy with the modern view, and even when confronted with Mr. J. Wright’s 2,100 foraminifera to the ounce¹, he makes no protest against the statement that “the fossils are almost certainly derivative like the boulders.” If this confession be interpreted as fickleness by some of his former co-workers, he can but consent to be relegated to the list of northern erratics now stranded in County Dublin. The reasons for the adoption of the land-ice theory in this district are conveniently summarised (pp. 60–61); and a suggestive remark follows:—“If at some future time Belfast Lough were again invaded by an ice-sheet, we should expect that its recent estuarine clays would be transported and intermingled with glacial detritus in the same manner that the Pre-Glacial and Early Glacial marine deposits have been intermingled with the boulder-clay. The smaller shells and

¹ *I.N.*, xii., p. 179, and *Proc. B.N.F.C.*, 1902–3, p. III.

foraminifera would be likely to escape the shearing stresses in the ice during this process more readily than the larger organisms." And so that bug-bear, the "Irish Sea glacier," stalks unabashed through the Memoir, and a sketch-map on p. 52 shows clearly how its edge struck the Down shore of Belfast Lough, and poured across the Silurian uplands into the Strangford basin.

The portions of the Memoir which, to our mind, furnish the most suggestive reading, are those which deal with the Belfast basin. Here we find an interesting fact put forward, and also an interesting theory. The fact in question is that the Pre-glacial course of the River Lagan differed considerably from its Post-glacial course, the choking of the valley with drift having pushed the stream far to the eastward of its former bed; while the theory referred to is the existence of an extensive late-Glacial "Lake Belfast" in the valley in which now the city stands. As regards the former point, the section across Belfast, illustrated on p. 85, and the remarks on the subject on p. 64 and elsewhere, can be referred to. With regard to "Lake Belfast," we have here a most interesting suggestion, and it is much to be regretted that the steady labour of mapping over 200 square miles of country left the Survey officers no time for the working-out of the problem. The occurrence of such lakes along the margin of an ice-sheet is a well-known phenomenon¹. In the present instance, the prevalence of gravelly deposits contouring the Lagan basin, and fringing the well-known red sands of the Belfast suburbs, is considered indicative of lake conditions. These gravels extend along the foot of the hills between Holywood and Knock, are much pronounced at the entrance of the Dundonald valley, and continue up the edges of the Lagan valley. The presence of such a lake, dammed in by an ice-lobe of the Irish Sea glacier extending up Belfast Lough as far as Holywood, would easily account for the formation of those striking deposits of fine red sands (appropriately named "Malone Sands" in the Memoir), which have arrested the attention and puzzled the mind of every worker in the Belfast district. It is true that the disposal of these sand-banks does

¹ For an account of a similar Glacial lake in the Dublin area, see W. B. Wright: "The Glacial origin of Glendoo."—*I.N.*, xi., 96-102. 1902,

not correspond with the present drainage of the country; they do not form recognizable delta-fans at the points where the existing streams would have debouched into the old lake; but probably, when the sands were laid down, the drainage was largely determined by the ice which still held sway on the rising grounds around. The fine esker of Lisburn, which, no doubt, represents one of these englacial drainage channels, shows how the local drainage, before the final passing away of the ice, differed from that obtaining at present. The thickness and extent of the gravels of the old lake-margin, and of the fine sands and clays of its deeper portions, bear witness to a very considerable inflow of water. How "Lake Belfast" was drained—whether through the Dundonald valley into Strangford Lough, or in some westward direction—is undecided, since no opportunity presented itself of examining the southern limit of the assumed lake-deposits, which are still in full force on the edge of the map at Lisburn; but the nature of the uppermost drifts in the Dundonald valley, and the great delta-like masses of late Glacial sands and gravels below Comber, strongly suggest that here the waters of the lake escaped into the ice-free inland waters of Strangford Lough. Owing to the arbitrary limits of the work of the officers of the Survey, a really fascinating problem is thus propounded without being definitely solved—one which is excellently suited to the talents and opportunities of local geologists.

We have already exceeded the usual limits of a review in this Journal, and must pass rapidly over a few of many interesting points not yet referred to. The curious little gorge or dry gap west of Holywood glen, and the gravel mass by the stream further up, point to a small ice-margin lake with lateral drainage in the glen; and Mr. W. B. Wright finds several other similar dry gaps in the north-west of the district, on the basaltic plateau, or *cuesta*, to use a convenient American term introduced in the Memoir, and applied to a steep escarpment backed by a long dip-slope.

In the Dundonald valley, Mr. H. B. Muff records (p. 113) a sand-pit yielding many fossils near Solitude, which the Geological Section of the Belfast Field Club might do well to plunder; and Mr. Seymour refers (p. 120) to an unusually large

boulder of the Ailsa Craig riebeckite-granophyre, which deserves to be preserved in the Belfast Museum. We have also to thank Mr. Seymour for the first record of the Quillwort (*Isoetes*) as an Irish fossil. Its macrospores were obtained in a peaty layer, under five feet of sand, near Annadale.

As regards the Post-glacial series, our knowledge of these beds having been summarized in recent papers by the present writer, this source has been largely availed of, and comparatively little new material is put forward. We note that Mr. M'Henry describes the upper portion of the raised beach at Ballyholme as a storm-beach. This explanation provides a convenient escape from the difficulty that the raised beach reaches here a considerably greater elevation than elsewhere in the area surveyed. But when these beds stood up as a vertical scarp all along the sea-margin, before the present sea-wall and slope were formed, the even bedding of the upper layers, as seen in the fine sections then exposed, did not suggest a storm-beach, though blown sand was clearly present in places. It may be pointed out that the Larne raised beach reaches a still greater elevation, and there the conditions are against a storm-beach, and blown sand is altogether absent. The interesting layer of peat underlying the raised beach at Ballyholme is referred to, but no mention is made of the similar bed at low water in Bangor Bay, nor of that which crops out at half-tide at the mouth of the Croft Burn, north of Holywood.

The chapter on Economics, besides the usual references to mines, water supply, building stones, &c., contains an account of the soils of the Lisburn district by Mr. Kilroe, who has submitted some representative samples to mechanical analysis.

Three appendices bring the Memoir to a conclusion. The first of these consists of some useful notes on the volcanic rocks of the district by Mr. Seymour. In the second are given the results of a large number of well-borings about Belfast. This information, largely personally collected by the officers of the Survey, is very interesting, as throwing light on the structure and history of the Belfast basin. But while, in a broad way, the sections recorded can be compared, a more exact attempt to reconstruct the old surfaces fails

for want of any common datum level. Lastly, Mr. W. B. Wright contributes an excellent bibliography of the geology of the district under review, including over 160 entries of books, papers, and notes. On the wrapper we are glad to see a priced list of the somewhat complicated series of publications of the Irish branch of the Geological Survey. This list is a distinct improvement on the similar one which appears on the English publications, inasmuch as the dates of issue of all the maps and memoirs are given; also the number of pages and figures in each memoir; so that the would-be purchaser knows what he is buying.

Five delightful photographs by Mr. Welch enhance the appearance of the Memoir, which otherwise, from the point of view of book-production, has little to recommend it. The printing, as well as the drawing of the line blocks in the text, is particularly poor. On opening the Memoir a hideous "fig. 1" hits one between the eyes, so to speak, in a really painful way. But, indeed, from one drab paper cover to the other, the 174 octavo pages of bad paper and bad print are redolent of that peculiarly soulless and inartistic atmosphere which we have learned to associate in these countries with Government publications.

REVIEW.

THE BELFAST FIELD CLUB.

Annual Report and Proceedings, Belfast Naturalists' Field Club. Ser. ii., Vol. v., Part 1, 1901-2; 2, 1902-3. Belfast, 1904. Pp. 131.

After an interval of two years (three years according to the dates on title pages), the Belfast Club has issued a part of its *Proceedings*, which used to be an annual publication. The present number covers the years 1901-2 and 1902-3, and gives accounts of summer excursions and abstracts of papers read at winter meetings. Of special interest to Irish naturalists are S. A. Stewart's notice of Prof. Ralph Tate, the virtual founder of the Belfast Club, and Joseph Wright's papers on the Foraminifera of the Boulder-clay of Knock and Woodburn. We notice that the present part of the *Proceedings* is not yet quite free from the misprints which have disfigured recent issues.

THE COMMON MUSSEL IN BELFAST LOUGH.

BY SIR ROBERT LLOYD PATTERSON, D.L., F.L.S.

My attention was lately recalled to a note of mine on the above subject which appeared in the *Irish Naturalist* for June, 1894; and it was suggested that I might bring the information up to date by giving the corresponding figures for the decade that has since elapsed. To save the trouble of referring back, I subjoin the figures given in the number mentioned of the quantity of Mussels (*Mytilus edulis*) exported from Belfast in the first three months, January, February, and March, of the following years, viz :—

1889	483 tons.
1890	256 „
1891	233 „
1892	5 „
1893	1 „
1894	1,532 „

similar returns for subsequent years up to the present being as follow (I am indebted for them to Mr. W. A. Currie, the courteous Secretary of the Belfast Harbour Commissioners):—

	First three months.	Whole year.
1895	705 tons	3,194 tons.
1896	1,076 „	3,518 „
1897	240 „	1,229 „
1898	2,237 „	3,974 „
1899	1,547 „	2,610 „
1900	694 „	1,287 „
1901	724 „	1,436 „
1902	660 „	1,214 „
1903	274 „	566 „
1904	65 „	

It will be observed that shortly after the almost blank years 1892 and 1893, and again after a comparatively small year, such as 1897, a considerable, in the latter case a very large, increase is shown; while, on the other hand, a considerable

diminution generally followed the big years, such as 1894 and 1896, 1899 being no exception, although the quantity is so large, as in that year newly-found beds continued productive till over-fishing had its usual result. The recuperative power of the Mussel is evidently very great, a couple or three years apparently sufficing to restock almost exhausted beds. In certain circumstances raking and dredging cause a great destruction of the bivalves besides those that are taken. A few years ago, when these methods of capture were in active operation on some beds off Marino and Cultra, a severe north-westerly gale came on with the result that an enormous quantity of Mussels, which had been forcibly detached from their natural "moorings" on the floor of the sea, were driven ashore at Cultra Point, where at high-water mark they formed a ridge about sixty yards long, two yards broad at the base, and between two and three feet high.

In October, 1898, the Inspectors of Irish Fisheries held an inquiry here, with the result that a close time for Mussels, from 15th May to 30th September, both days included, was promulgated. This I considered very desirable; but the Mussel-fishers objected; and, after some time, the restriction was either modified or entirely removed—I forget which—the result being apparent in the diminished returns of the last couple of years. This year I saw several of the Mussel boats lying in Conn's Water, laid up unused.

The Mussels fetched 10s. per ton at the ship's side; and, besides those exported, some were used for bait by the Ardglass and other fishermen, and some are locally used as food, so it will be seen that the industry was one of some importance to those engaged in it, and its recurrent decline, due in my opinion to overfishing, is much to be regretted.

So far written, a friend, to whom I was speaking on the subject, lent me the "Report on the Irish Fisheries for 1902," published by the Department of Agriculture and Technical Instruction, on p. 70 of which are given returns of the take of Mussels in eight coastguards' districts mentioned. I cannot accept the figures there given as accurate—that for the Carrickfergus district being 1,029 tons for that year, while the official Belfast figure is 1,214 tons, or 185 tons more. It may be that the Department's figures are accurate as far as they

go, but incomplete. Be that as it may, the returns from eight districts total 1,688 tons, deducting from which the 1,029 tons credited to Carrickfergus, would leave only 659 tons for the other seven places, of which Valentia with 358 tons is the largest, and Waterford with 10 tons the smallest. From the prices stated to be realised—ranging from £1 10s. per ton at Waterford to £5 per ton at Pullendiva—and from their destinations—viz., Liverpool, Bristol, Leeds, Manchester, Bradford, Derby, Wolverhampton, and Preston—it is evident that all these are used as food, except possibly some from Pullendiva which go to Glasgow. The return under notice states that at Waterford 120 persons find employment in gathering Mussels, that the quantity gathered was 10 tons, the price obtained £1 10s. per ton, and the value £15, which works out 2s. 6d. per head for the 120 people. Arrived at in the same way the 10 persons stated to be employed in the Carrickfergus district, at 10s. per ton for 1,029 tons, realised £51 12s. each (on an average of course); but I am satisfied that the number of persons mentioned in the latter case is largely understated. I have seen 15 to 20 boats, none of them manned by less than two hands, discharging, or waiting their turn to discharge, their “take” into the Scotch steamers. Calculated in the same way, the earnings of the Mussel gatherers at Pullendiva averaged £80 11s. 4d. each. Comparing that with the 2s. 6d. at Waterford, one may naturally infer that there is some mistake somewhere. Local fishers used to complain that in the hurry of loading on board the steamers there was often no time for weighing, and they sometimes lost from one to two or even three cwt. to the ton in giving overweight.

Croft House, Holywood

NOTES ON THE BIRDS OF LOUGH DERG
AND ITS SHORES.

BY ANTHONY PARKER, J.P.

GARDEN WARBLER (*Sylvia hortensis*, Bechst.).

THIS Warbler still frequents its usual haunts here, but I have, as yet, failed to hear it elsewhere than in the Shannon valley. In 1901, and again in 1902, I heard it on April 25, the earliest date upon which I have recorded it—never having noticed it before May in any other year. This year it was very late in arriving; I did not observe it until May 8th, although on the look-out for it. On June 7, 1900, I found a nest with five young, and they had flown by June 11.

SISKIN (*Carduelis spinus*, Linn.).

This species is such a rare visitor here that I think it worth notice. On February 26, 1900, I saw a small flock on some Alders by a stream which flows through the demesne; and again, on February 9, 1902, I saw them in the same locality, but do not remember to have seen them anywhere else.

SHOVELER (*Spatula clypeata*, Linn.).

In June, 1901, a pair frequented the little bay here, and I was almost certain they had a nest; but the Bald Coots persecuted the ducks so that they left, after having been here up to June 18.

On May 27, 1903, my nephew found a nest on one of the islands off the Clare shore opposite this place.

TUFTED DUCK (*Fuligula cristata*, Leach).

On the 10th of May, 1904, we started for Dromineer on the Tipperary side of Lough Derg; thence we went by a row-boat to a small island, where a pair of Tufted Ducks were swimming close by; on then to another island, where there were two pairs more swimming some distance off.

We then rowed across to the Connaught shore ; in one bay there were four Tufted Drakes on the water together—no female ; but on an island not far away was a duck of the same species partly eaten.

It is very remarkable how these birds have increased of late years in the breeding season. There were a good many last winter, too, more than usual about here.

STOCK-DOVE (*Columba oenas*, Linn.).

This bird still continues to frequent this place, although many of its favourite breeding haunts have been laid low by the terrible storm of February, 1903.

So far as I can ascertain, Stock-Doves appear, if undisturbed, to breed twice in the year, the first lot leaving the nest towards the end of May, when the old birds seem to take them away, as though to teach them to do for themselves. Towards the middle or end of June they seem to return again and prepare for a second brood.

Generally the nest is in the hollow stump of an ivy-covered tree, or the thick growth peculiar to the Lime tree. When in the latter, and the trees in full leaf, it is sometimes very difficult to get them to leave the nest, and quite out of the question to reach it by climbing.

In autumn and winter, however, they seem more shy and wary than the Wood-Pigeon, although they are sometimes shot "flying" with the latter from their feeding grounds.

WOODCOCK (*Scolopax rusticola*, Linn.).

On July 18, 1903, my keeper showed me a Woodcock's nest with three eggs which he had found on July 12. On July 26 she was still sitting, but a couple of days later left with two young ones. A few days later I saw Woodcock quoted for sale in the Dublin Corporation markets !

LESSER BLACK-BACKED GULL (*Larus fuscus*, Linn.).

I have been able to observe the breeding of this gull on Lough Derg. On June 4, 1902, my son and a nephew were "dapping" together from a boat, near the Clare shore of Lough Derg, when the latter observed a

Black-backed Gull sitting hard on a bare reef of rocks, forming a small island. The nest was only about eight inches above water-level, and contained three eggs, one of them just hatched out, the chick in another breaking the shell. On June 11 I took one of the young birds, and it throve so well for a few days that I sent for the second. The third egg did not come out.

The young birds had a healthy appetite, and were apparently thriving well, but first one and then the other got stiff in the joints of the leg, and were unable to stand up. Both died, the second on July 15. On May 13th this year another nest was found near the same place containing three eggs, on which the gull was sitting.

Castle Lough, Nenagh.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include two Green Monkeys from Mr. W. F. Manice, and two Green Monkeys from Mr. W. Adams, a pair of Crowned Pigeons from Mr. Henniker Heaton, six Rudd from Mr. Leonard, a Tortoise from Dr. M'Weeney, a Crested Mynah from Mr. H. B. Rathborne, and eleven foreign birds from Sir John Maxwell.

The Elephant "Padmohati," and an elegant little carriage drawn by a Shetland Pony, are now available for carrying children around the gardens. A new entrance for members from the Polo Ground can now be used.

DUBLIN SOCIETY FOR THE PROTECTION OF BIRDS.

We are very glad to hear of the formation in Dublin of a society whose object is to encourage a deeper and more intelligent interest in a group of animals that is especially open to persecution, though it includes many of the most beautiful and of the most useful of all living things. Lady Ardilaun is President, Miss Constance Pim and Mrs. Hogg Honorary Secretaries, and the committee includes several of our best known Irish ornithologists, such as Rev. C. W. Benson, R. M. Barrington, and C. B. Moffat. We wish the new society every success, and shall watch its progress with interest and sympathy.

BELFAST NATURALISTS' FIELD CLUB.

MAY 21.—EXCURSION TO HILLSBOROUGH.—This excursion created a record, as one hundred and sixty-seven members and friends attended. The party travelled to Hillsborough by the 1.45 train, and were met by Mr. Nevin H. Foster (Hon. Secretary), who was both guide and host for the day. By permission, the demesne of the Marquis of Downshire was first visited, and proved a good collecting ground. On arrival at the lake, a swan sitting on her nest was pointed out, while dotted over the water were to be seen Mallards, Coots, Moorhens, and Little Grebes. But the scene which elicited most numerous expressions of admiration was the fine collection of conifers growing by the upper end of the lake. These afforded typical nesting sites and feeding places for the numerous Great, Blue, and Coal Tits, Redpolls, Golden-crested Wrens, and Siskins, which flew about from tree to tree. On the way to the old castle the members were disgusted at the blot on the fair landscape made by the keepers' "museum." Hanging on a tree, in various stages of putrefaction, were half a dozen Owls and the same number of Kestrels, along with Sparrow-hawks and Stoats. Merely from the low standpoint of game preservation little objection can be taken to the two latter, but how many years must elapse before the ignorant gamekeepers learn that Owls and Kestrels are the best friends they have, and should be strictly protected? It has been pointed out over and over again in various journals and newspapers that Owls and Kestrels live chiefly on rats and mice, and are most beneficial in clearing off enormous quantities of these pests. Rats will destroy all the eggs they can get at, therefore keepers should, in their employers' interests, preserve Owls and Kestrels as the deadly enemies of rats, but ignorance and prejudice are hard to overcome, and so the innocent suffer for the guilty. To add to their feelings of disgust the members were shocked to observe that in most cases the legs of the victims showed clear evidence of a lingering and painful death by the odious pole-trap. Fortunately the Pole-trap Act, which has recently passed through Parliament, will put an end in future to such barbarity, which is a disgrace to civilisation.

Some damp, mossy glades in the woods were searched for the smaller land shells. Here *Hyalinia radiatula* was found, with its rare pale-green variety. The lakes yielded abundance of *Planorbis albus*. Rather fine specimens of *Valvata cristata* were plentiful near the margins, with some large *Pisidium fontinale*. Near the old castle the very local *Limax flavus* lives in old trees. One of the tree snails, *Balea*, was observed on old trees, but in small numbers. After being photographed, the large party went to the Corporation Arms Hotel, where tea was kindly provided by Mr. and Mrs. N. H. Foster. Afterwards a short business meeting was held, and twelve new members elected.

The 6.30 train brought the members back to Belfast.

NOTES.

ZOOLOGY.

Allolobophora cyanea in Ireland.

Among some earthworms I received on February 16th from the neighbourhood of Finea, Co. Cavan, I found one which I was not familiar with. On examining it more closely I found it agreed with Mr. F. Beddard's description of *Allolobophora cyanea* Savigny in colour, positions of the clitellum and the tubercula pubertatis, and also in the arrangement of the setæ. It is, however, much shorter than the type, there being only 90 instead of 156 segments. Mr. Beddard has very kindly examined the specimen, and has been able to confirm my diagnosis. It has been recorded from Europe and the Argentine, but has not yet been found in England.

J. TRUMBULL.

Malahide.

White Wagtails.

Irish ornithologists will be glad to learn that *Motacilla alba* has visited Bartragh on its way north this season. My friend, Captain Kirkwood, observed a little flock of six birds on the 10th May; these only remained to rest for an hour and then resumed their northern flight. On the 13th he observed a solitary bird, which he kindly shot for me as I required the specimen for the Belfast Museum.

These birds were seen, as usual, to haunt the damp sandy flat of pasture outside the garden at Bartragh, and were evidently delayed on their northern journey by the high north-west wind blowing on the days previous to their arrival. They have now been observed on Bartragh Island for seven years in succession, regularly appearing in April or May and almost always after, or during a gale of north, north-west, or north-east wind. So I think there can be no doubt now of their line of spring migration passing over Bartragh directly north.

ROBERT WARREN.

Moyview, Ballina.

Turtle Dove in Co. Down.

On 24th May, a bird was shot in this neighbourhood and submitted to me for identification. It proved to be a female of one of our rarer summer visitants—the Turtle Dove (*Turtur communis*). It had eggs in the ovary and showed no traces of having been in captivity. There are only two recorded instances of this bird having bred in Ireland (both more than half a century ago), though it is common in England.

NEVIN H. FOSTER.

Hillsborough.

BOTANY

Botanizing en route (Dublin and Wicklow).

On the way to Drogheda on June 11 I thought I saw the blue-gray foliage of *Elymus* on the east side of the railway cutting just south of the Delvin River. Returning in the evening, a speed of 65 miles an hour made botanizing difficult, but I located a large patch of this grass in the place indicated. As to the standing of the plant here, railway cuttings are always suspicious habitats, but there appears at least no reason for a deliberate planting of the grass at this spot, as at Bray (*J.N.*, x., 20) and the sea-shore, the natural habitat of the species, is close at hand. The Bray colony, it may be noted, is flourishing prodigiously, and displays already (June 8) an abundance of flower-stems. Skerries is the only other recorded Dublin station for this handsome grass.

Proceeding by steam tram to Brittas on June 12, *Crepis biennis* was seen in abundance in several fields of grass beyond the Embankment station. This plant was added to the Dublin flora by Mr. Colgan only lately from Killiney (*J.N.*, xi., 184). Later in the same day, the beautiful *Viola lutea* was seen in glorious profusion, making the short pastures quite yellow, in fields at Ballyfolan, 1½ mile N.E. of Kilbride, Co. Wicklow, and thence it occurred frequently to the county boundary near Brittas and Talbotstown. Lackan, six miles to the S S.W., is the only previously recorded Wicklow station (*Recent Add.*, 1872). On June 19, *Saxifraga stellaris* was seen in great abundance along the Shankill River from Kilbride camp almost to Cloghleaigh Bridge, a distance of over a mile. The range of elevation here is 1,100 to 800 feet. The plant also grows by springs on the hills overlooking Kilbride camp.

Coming from Wexford in January, I noticed from the train a fine growth of *Cladium Mariscus* in the Murrough marshes, between Newcastle and Kilcoole. This plant was found on the Murrough—its only Wicklow station—by Dr. Moore some time before 1866 (*Cyb. I.*), but there does not appear to be any note of its having been seen in the county since.

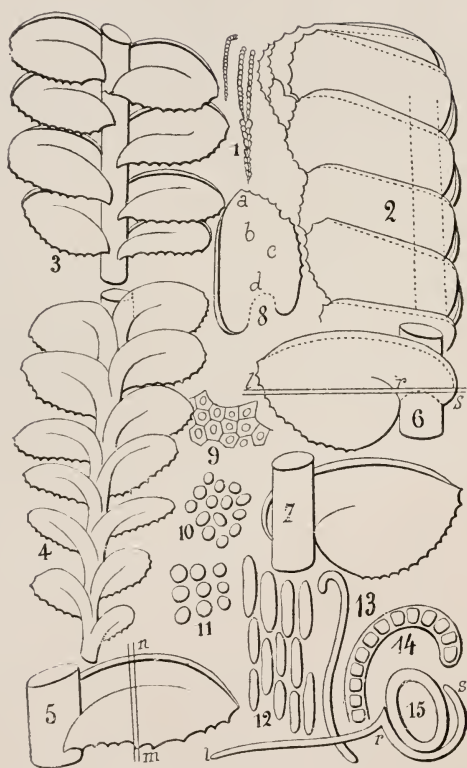
R. LLOYD PRAEGER.

Dublin.

OBITUARY.

CLAUDE W. BUCKLE.

With the deepest regret, we record the premature death, in the early spring of this year, of one of the most careful and talented entomologists who ever worked in Ireland. During his residence in the Foyle and Belfast districts, Mr. Buckle formed a very large and beautifully mounted collection of beetles and other insects. His two noteworthy papers in this Magazine—"Beetles Collected in Lough Foyle District," vol. ix., pp. 2-11, and "Entomological Notes from Ulster," vol. xi., pp. 40-44—contain over fifty additions to the Irish fauna. His power of discriminating species among the *Staphylinide* and other obscure families was wonderful. His early death is a sad loss to Irish zoology.



ADELANTHUS DUGORTIENSIS.

A NEW HEPATIC.

BY REV. H. W. LETT, M.A., M.R.I.A.

[PLATE 2.]

DURING a short visit in June, 1903, to the Island of Achill, Co. Mayo, with the object of investigating the mosses and hepatics for the Fauna and Flora Committee of the Royal Irish Academy, I found a hepatic which was quite new to me, and I sent it to Professor Douin, of Chartres, who described it in the *Revue Bryologique* for May, 1904. The following is a translation of his description:—

Adelanthus dugortiensis, Douin and H. W. Lett, *sp. nov.*—Plant dioicous (?), of a brownish-yellow colour. Stem 10-50 mm. long, branched (fig. 1), branches rising laterally before the stem, which also afterwards lengthens [or sends out a shoot—H.W.L.] at the apex; when dry the tops of the branches are incurved like a bishop's crozier, this is also sometimes the case when the plant is in a moist condition. In a transverse section the stem is elliptic (fig. 15), having a distinct border of three to five rows of coloured cells with thick walls, the cells of the middle being hyaline and thin-walled.

Leaves elliptic in shape, 1.1—0.75 mm. long at the ends of the chief branches, much smaller towards the base of the shoot (fig. 4).

In the normal form (fig. 2), the leaves are arranged erect on either side against the stem, which thus lies between them, as in *Alicularia compressa* and *Jamesoniella Carringtoni*, their ends being turned forwards to the front [they are homomallous—H. W. L.]

In the topmost leaves the back margin is entire and strongly reflexed, along (figs. 3, 5, and 7) to its insertion (fig. 2) in the stem, where it very distinctly embraces the stem (fig. 15).

In the leaves on the lower part, the back margin is much less distinctly volute. The end and front margin are flat and toothed (except near the insertion, where the margin is entire); these teeth are small and consist each of one projecting cell. The cells of the margin of the leaf have very distinct walls (fig. 9), and are clearly marked by lines into polygonal shapes; they are 16-30 μ in diameter. With regard to the other cells (figs. 10, 11, and 12), their walls are indistinct where they touch each other, and there remains little but the inside shape showing that they were wider and separated by very thick walls. At the base and in the middle portion of the leaf (fig. 12) the cells are much elongated, 15-20 μ wide and 40-75 μ long. The epidermis is smooth.

When the surface of a leaf is viewed from above, it presents the following features from the anterior or front edge to the posterior or back, first a front flat-toothed margin, then a convex surface, next a concave portion, and lastly the back or posterior revolute margin.

There are no under-leaves or amphigastria. The antheridia, archegonia, and fructification are all as yet unknown.

Growing on shady rocks amongst *Scapania gracilis*, *Hymenophyllum tunbridgense*, etc., at 2,000 ft. above the village of Dugort, Achill Island, Co. Mayo, Ireland, 24th June, 1903.

Observations.—In the genus *Adelanthus* the female flowers are found on very short branches at the base of the stem. I have searched for them in vain on the little specimen which has been sent to me.

Herr F. Stephani, the distinguished hepaticologist, to whom I submitted it, writes:—"The plant which you have sent me is an *Adelanthus*, unknown till now; it is the most interesting discovery which we have received for a long time; the plant is very close to *A. unciformis* (Tayl.) Spr., which is found at the Cape of Good Hope, in Madagascar, and at Cape Horn, Ireland, as doubtless you are aware, is a country classic for an ancient flora still preserved there, though lost in the neighbouring countries. Your new plant belongs to a small group of rare species which have the characteristics of the hepatics of hot climates. A great many of these 'plantæ relictæ' of Ireland are known only in a barren condition."

The back margin of the leaves, which is curiously incurved, easily distinguishes this new hepatic from all the other European species. This characteristic, however, is less noticeable than in *A. unciformis*, which is quite different in the large teeth of its leaves. It is very near it, if it be not the same species.

I have no doubt that in further researches a plant with flowers will be found. I have complied with Mr. Lett's wish that the name of the village near which it was discovered should be given to the plant.

Through the courtesy of Professor Douin and the generosity of Herr Stephani, I have been able to compare a specimen of *Adelanthus unciformis* (Tayl.) from Terra del Fuego with the plant from Co. Mayo. The size, colour, and general appearance are much the same. But the leaves of *unciformis* are larger, much closer to each other at the stem, more square in outline with a more acute point, more homomallous, the teeth of the margin stronger, and the areolæ smaller than in *dugortiensis*. These points of difference are very distinct when stems of both plants are examined side by side on the same slide with a 2 in. or 1 in. object-glass.

EXPLANATION OF PLATE.

1, plant, natural size; 2, end of a branch, side view (normal form); 3, thinner part of branch seen from above; 4, the same seen from below with the lower leaves much smaller; 5, a leaf taken from No. 3, and seen from above; 6, a leaf from No. 2, side view, from below; 7, the same seen from above; 8, a leaf removed from the stem, and seen from above; 9, cells of leaf No. 8 taken from the point *a*; 10, cells of the same leaf taken at *b*; 11, cells of the same leaf taken at *c*; 12, cells of the same leaf taken at *d*; 14, section of upper part of fig. 13 showing the involute margin; 13, transverse section of above through *mm.* (fig. 5); 15, transverse section, of the stem and a leaf through *lrs* (fig. 6). (Figs. 2-8 $\times 18$; figs. 9-12, 14, $\times 100$; figs. 13, 15, $\times 36$).

REVIEWS.

FOR BEE-KEEPERS.

The Irish Bee Guide, a Manual of Modern Bee-keeping. By Rev. J. G. DIGGES, M.A. Pp. 220. 110 figures and many plates. Lough Rynn: "Irish Bee Journal" Office. Price 2s. (paper covers), 3s. (cloth).

The writer of this little book is well known as Editor of the *Irish Bee Journal* which for several years past has proved a most useful channel of information for Irish bee-keepers. And now he has given us in an attractive and handy form—so far as it can be given by clear description and excellent illustration—all that the beginner in apiculture needs to know and much that will prove of value to the expert.

The book is divided into three sections. In the first, the natural history, anatomy and life-history of the Hive-bee are discussed; this section is illustrated with a very good selection of figures, mostly from the classical work of Cheshire. The structure of the bees, both external and internal, is described accurately and in sufficient detail, while the story of their lives and labours is told vividly and poetically. The second part of the book contains an account of hives and their fittings, as well as of the various appliances for feeding and handling bees, and for extracting honey and wax.

But it is the third and largest division of the book that will appeal especially to the practical man, for here are found directions for manipulating the bees and using the appliances. Breeding, swarming, hiving, rearing, feeding, and marketing are all, in turn, fully discussed. Nor are the diseases of bees forgotten, foul brood being dealt with at length, and the means for its prevention and cure pointed out. We heartily congratulate the author on the publication of this book, which is well printed on paper that shows up to advantage the numerous "half tones" distributed in the text.

THE MOTHS OF THE BRITISH ISLANDS.

A Natural History of the British Lepidoptera : a Text-book for Students and Collectors. By J. W. TUTT, F.E.S. Vol. iv. (with Synopsis of Contents of and General Index to Vols. i-iv.) Pp. 535, portrait and 3 plates. London : Swan, Sonnenschein & Co., 1904. Price, 1/. net.

Each volume of Mr. Tutt's monumental work surprises the reader by the vast amount of information which it contains, and inspires deep admiration for the untiring industry of the author. As the previous volumes have not been noticed in this Journal, it may be of interest to give a general review of their contents. Vol. i. (published in 1899), contains eight introductory chapters on the egg and embryology of the Lepidoptera, the inner and outer structure and defences of the larva, and colour-variation in the imago. Then the subject of classification is taken up, and Mr. Tutt gives his reasons for abandoning the schemes proposed in recent years by Comstock, Dyar, Hampson, and Meyrick, and arranging the families of the Lepidoptera in three great series or stirpes—Noctuo-Hepialid, Geometro-Eriocraniid, and Sphingo-Micropterygid. These divisions rest chiefly on the form of the egg, which being largely an adaptive character is not reliable for the purpose of a primary classification. The arrangement adopted by Mr. Tutt has the practical inconvenience of leading the student up from the generalized forms to the specialized families of the same "stirps," and then returning to the primitive members of the next "stirps." It seems to us that the more natural arrangement would be to take all those families that are now universally admitted to be generalized, and to treat of them first, passing on to the higher groups afterwards. Mr. Tutt's scheme is dependent on a special theory of phylogeny, which many morphologists will be unable to accept.

The stirps first considered is the Sphingo-Micropterygid, and the survey of the included families takes up all the four volumes so far issued. In vol. i. are described the Micropterygidæ, Nepticulidæ, Cochlididæ, and Anthroceridæ. Vol. ii. (published 1900), contains five most valuable introductory chapters on the metamorphosis of the Lepidoptera, with special reference to the external and internal structure and phylogeny of the pupa. Then the systematic treatment is continued with the Psychids (considered as a "super-family" comprising several families), and an instalment of the Lachneidæ (Eggar-moths). The account of the little-known Psychids, filling over 300 pages, is particularly admirable and valuable. In vol. iii. (published 1902), the Eggar-moths are finished, our single species of the Dimorphidæ (Endromidæ), and of the Saturniidæ are surveyed, and the Sphingids are commenced. The fourth volume now before us concludes the Sphingids.

The thoroughness with which Mr. Tutt's work has been done will be appreciated from the fact that the thirteen species described in this volume have over 500 pages devoted to them. Many British students of the Hawk-moths will be surprised to see nearly every species placed in a distinct genus—*elpenor*, for example, is separated from *porcellus*, *livornica*

from *galii*, and *galii* from *cuphorbie*; *pinastri* from *ligustri*, and *ligustri* from *convolvuli*. This generic "splitting" is undoubtedly warranted by structural characters, and its acceptance by all serious students is only a matter of time. We doubt, however, if the names which Mr. Tutt adopts for these genera will meet with acceptance. Urged on by what is supposed to be an uniform "law of priority," various systematists are arriving at results that threaten to confuse the whole nomenclature of the Lepidoptera. Messrs. Rothschild and Jordan have lately published a monograph on the Sphingids of the world, and the genera they accept are accepted also by Mr. Tutt. But when we come to names anarchy reigns supreme. For example they call *ligustri* *Hyloicus*, he calls it *Sphinx*. They apply *Sphinx* to *ocellatus*, which he calls by the familiar *Smerinthus*. But they retain *Macroglossa* for *stellatarum*, which Mr. Tutt finds it necessary to regard as the type of *Sesia*! If there were any prospect of arriving at finality, the body of working naturalists might be induced to accept these changes; but when no two authorities can agree what changes are required, is it any wonder that most workers prefer to keep to names which they know and which all understand?

But enough of such disputes about words and names. The student will turn to Mr. Tutt's book, not for barren discussion, but for information how his favourite insects live, feed, grow, pupate, vary, migrate—and he will not be disappointed. In the volume before us, taking, for example, an insect which often attracts notice in this country—the Death's-head—we find over 70 pages devoted to the species. There is a discussion of the feeding-habits of the caterpillar—so commonly found in potato fields—in relation to its protective coloration, and a long and interesting account of the well-known squeaking sound made by the moth, and the various theories that have been put forward to explain it. Mr. Tutt leans to the view that the sound is caused by the expulsion of air from the oesophageal sac to the exterior at the base of the proboscis. Another biological point of special interest, dealt with at length, is the "terrifying" attitude and marking of the *elpenor* caterpillar.

Full information on the occurrence and distribution of the various species will be found, but we cannot congratulate Mr. Tutt on his arrangement of this material. The counties of all divisions of the United Kingdom are given alphabetically, *e.g.*, Aberdeen, Armagh, Berks. Consequently it requires no little patience to trace the Irish range of any particular insect. The only other serious criticism which we are disposed to make is that structural figures of the characters relied on for the separation of the genera would have added largely to the value of the book.

But Mr. Tutt has given us so much that it is perhaps ungracious to complain that we have not more. The volumes are unrivalled as a scientific account of the families of which they treat, and we do not wonder that the author, realizing the magnitude of the task on which he has entered, asks for collaborators to aid him in the volumes yet to come. We heartily wish him worthy helpers and a joyful completion of his great work.

G. H. C

NAJAS MARINA IN THE MEGACEROS-MARL OF LOUGH GUR.

BY CLEMENT REID, F.R.S.

So little is yet known about the Prehistoric and newer Tertiary flora of Ireland, that the discovery of *Najas marina* may encourage botanists to take up the subject. Dr. Scharff a few weeks ago sent me three small samples of peat, marl, and sand, from excavations made at Lough Gur in order to obtain *Megaceros*. The samples were too small to yield many species; but they showed that here, as at other spots, the marly deposit is largely a *Chara*-marl, yielding also freshwater shells, leaves of sallow (*Salix cinerea*), and a few seeds of common bog plants. One fruit only of *Najas marina* was also found.

Najas marina is a submerged flowering plant which, in Britain, only lives at a single spot, in Hickling Broad in Norfolk. Its former distribution, however, was much wider. It occurs at several localities in Norfolk and Suffolk in the Preglacial "Cromer Forest-bed"; it is found in a newer deposit (probably Interglacial) at Hitchin, in Hertfordshire; it also occurs in Barry Docks, in South Wales, in a marl associated with a submerged peat, in which was discovered a polished stone implement. The marl at Barry Docks may be of the same date as the *Megaceros*-marls of Ireland.

From Ireland *Najas marina* has not been recorded previously; but the distribution of the species of this genus is singularly sporadic in both living and fossil state. *N. flexilis*, still living in Ireland, has not yet been found fossil in Britain, though it occurs both recent and fossil at several places in Scandinavia and Germany. *N. graminea*, a widely distributed tropical species, lives in Britain as an accidental introduction into a canal which receives waste hot water from a mill. *N. minor*, a plant of the Mediterranean region and of central Europe, is found in Britain in Preglacial and Interglacial beds.

Geological Survey, London.

THE DIARY OF AN IRISH NATURALIST.

BY R. F. SCHARFF, PH.D.

IN the year 1843 an excellent and instructive paper appeared in the *Annals and Magazine of Natural History* "on the species of *Limax* found in Ireland." This was one of the earliest notices which have been published on the habits and distinctive characters of our Slugs. As the author, the Rev. Benjamin James Clarke, was an Irishman, this fact may be of additional interest to the readers of the *Irish Naturalist*.

Though he seems to have been a correspondent of William Thompson, very little has been recorded of the life of this keen observer, except that we gather from his paper just referred to that he inhabited a place near Portarlington in the Queen's Co. called "La Bergerie."

Quite recently Mr. Clarke's diary, written in the years 1837 and 1838, which proves to be of considerable interest to naturalists, came into the possession of our Museum. His power of observation and wide knowledge, as revealed in the diary, are very remarkable; and the keenest pleasure is evinced throughout the pages in noting down the facts of Nature as they presented themselves to him. The animated world around him seems to have been a source of intense interest to him.

On page 21 we read about the fights he observed between the large larvæ of dragon-flies and sticklebacks. He relates how he saw one of the former fiercely attacking a fish twice its own size with its mandibles, which it firmly fixed in the head of its prey. Then, again, he notes the ravages caused to gooseberry and currant bushes by the larvæ of the sawfly and gooseberry-moth, both of which left black currant bushes untouched.

A particularly interesting capture which entomologists, no doubt, would wish to have verified by the actual specimen is one recorded on page 21. He notes having taken a specimen of the "Clifden Beauty" at dusk on the Emo Road, being the first of that rare moth ever captured by him about this neighbourhood.

But Mr. Clarke was not unmindful of the existence of other insects, and records (p. 47) having taken the rare beetle *Carabus nitens* off the bog of Clonbullock. Even microscopic creatures were not beyond his ken, for he tells us of the occurrence of *Hydra viridis*, *Cyclops quadricornis*, and *Cyclops castor* in the neighbouring ditches (p. 128).

When we come to his special subject, the land and fresh-water Mollusca, his remarks are naturally of particular interest. *Planorbis corneus* he refers to as being very plentiful in the townland of Clonmney, and he also mentions *Helix fusca*, *Helix lamellata*, *Acme lineata*, *Cocilianella acicula*, *Buliminus obscurus*, and other uncommon species as occurring in the neighbourhood.

Ornithologists will be interested to learn that on Mr. Clarke's authority the Crossbill was seen near La Bergerie in the spring of 1838, one gentleman having shot no less than seven of them.

Dublin Museum.

NOTES ON THE MOLLUSCA OF NORTH CORK AND WATERFORD.

BY P. H. GRIERSON.

THE following notes were made during the summer and autumn of 1902 and summer of 1903, in the northern portion of the Co. Cork and in Co. Waterford, over an area extending across the greater portion of the south of Ireland, and varying greatly in its soil and geological features.

I have confined myself simply to giving the name of the nearest town to where the specimens were taken, with the number of the one-inch Ordnance Survey map after it. I have followed Dr. Scharff's nomenclature as given in *Irish Naturalist*, 1892.

I am much indebted to Messrs. L. E. Adams and R. Welch for help—the former for naming slugs, &c., and the latter for sending me the names of *Hyaliniæ* and *Pisidia*. The troublesome immature *Hyaliniæ* Mr. Welch submitted to Messrs. L. E. Adams or G. W. Taylor, and the *Pisidia* to Mr. Oldham.

North Cork comprises all that portion of Co. Cork north and east of River Lee, and is denoted in the following by "N.C." Co. Waterford is given as "W."

Vitrina pellucida, Müll.—N.C. East and West of Macroom (185-186), Castletownroche (176).

W. Mount Congreve (168), Cappoquin (177), Stradbally and Dungarvan (178).

Hyallina cellaria, Müll.—N.C. Doneraile (164), Carrigtwohill (187), Castlemartyr and Killeagh (188).

W. Waterford (168), Cappoquin (177), Dungarvan (178), Dunmore (179), Portcullly (var. *albina*) (179), north of Youghal (188).

H. allaria, Miller.—N.C. Liscarroll (164), Killeagh (188).

W. Mount Congreve (var. *viridula*) (168), Cappoquin (type and var. *viridula*) (177), Tramore (179), 6 miles north of Youghal (var. *viridula*) (188).

H. nitidula, Drap.—N.C. Doneraile (164), Mallow (175), Castletownroche (176), Middleton and Carrigtwohill (187), Killeagh (188).

W. Mount Congreve (168), Cappoquin (177), Dungarvan (178), Tramore (179).

H. pura, Alder.—

W. 6 miles north of Youghal var. *nitidosa* (188).

H. radiatula, Alder.—N.C. Mallow (175), East of Macroom (var. *alba* (186), Middleton (187), Castlemartyr (188).

W. Waterford (168), Cappoquin (177).

H. crystallina, Müll.—N.C. Killeagh (188).

W. Cappoquin (177), Portcullly (179).

H. fulva, Müll.—N.C. Killeagh (188).

W. Cappoquin (177), 6 miles north of Youghal (188).

H. excavata, Bean.—N.C. 2 miles west of Macroom (185), Killeagh (188).

W. 6 miles north of Youghal (188).

H. nitida, Müll.—N.C. Mallow (175), Middleton (187), Castlemartyr (188), Shanagarry (196).

Arlon ater, L.—N.C. Charleville (164), 6 miles west of Macroom (185), Middleton and Youghal (188).

W. 6 miles north of Youghal (188).

A. subfuscus, Drap.—N.C. Macroom (186).

W. Cappoquin (177).

A. hortensis, Fer.—N.C. Youghal (188).

W. Dunmore (179), 6 miles north of Youghal (188).

A. circumscriptus, Johnst.—

W. Cappoquin (177), Dunmore (179).

Limax maximus, L.—N.C. Macroom (186), Youghal (188).

W. 6 miles north of Youghal (188).

L. flavus, L.—N.C. Macroom (186).

W. Cappoquin (177).

- Limax marginatus**, Müll.—N.C. Macroom (186).
W. Cappoquin (177).
- Agriolimax agrestis**, L.—N.C. Macroom (185-186), Youghal (188).
W. Cappoquin (177), Dunmore (179).
- Amelia Sowerbyi**, Fér.—N. C. Youghal (188).
W. Dunmore (179).
- Helix pygmæa**, Drap.—N.C. West of Macroom (185).
W. Cappoquin (177).
- H. rotundata**, Müll.—N.C. Liscarroll (164), Doneraile (165), Castletownroche (176), near Macroom (var. *pyramidalis*) (185-186), Middleton (187), Killeagh (188), Shanagarry (196).
W. Mount Congreve (168), Cappoquin (177), Dungarvan (178), Dunmore (179), north of Youghal (188).
- H. rupestris**, Drap.—N.C. Liscarroll (164), Fermoy and Castletownroche (176), Middleton (187), Youghal (188).
W. Mount Congreve and Waterford (168), Cappoquin (177), Dungarvan (178).
- H. pulchella**, Müll.—N.C. Kanturk and Mallow (175), Middleton (187), Youghal (188), Shanagarry (196).
W. Cappoquin (177), Dunmore and Portcullly (179), Dungarvan (var. *costata*) (178).
- H. aculeata**, Müll.—N.C. Macroom (185-186).
W. 6 miles north of Youghal (188).
- H. lamellata**, Jeff.—N.C. Killeagh (188).
- H. hispida**, L.—N.C. Charleville and Liscarroll (164), Doneraile (165), Mallow (175), Castletownroche (176), Macroom (185-186), Blarney Castle (186), Middleton (187), Shanagarry (196).
W. Mount Congreve (168), Portlaw (167), Cappoquin (177), Stradbally (178), Dunmore (179), 6 miles north of Youghal (188).
- H. rufescens**, Penn.—N.C. Mallow (175), Fermoy (176), Blarney Castle (186), Middleton (187), Killeagh (188), south of Cloyne (195), Ballycotton (196).
W. Cappoquin (177), Dungarvan (178), Dunmore (179), Ardmore (188).
- H. fusca**, Mont.—W. Cappoquin (177).
- H. virgata**, Da Costa.—N.C. Middleton (187), Youghal (188), Ballycotton (196).
W. Colligan (177), Dungarvan and Stradbally (178), Tramore and Dunmore (179).
- H. intersecta**, Poir.—N.C. Mallow (175), Castletownroche and Fermoy (176), Middleton (187), Youghal (188), Ballycotton (196).
W. Portlaw (167), Cappoquin (177), Portcullly, Tramore, and Dunmore (179).
- H. ericetorum**, Müll.—N.C. Glanworth and Castletownroche (176), Youghal (188), Shanagarry (196).
W. Dungarvan (178), Tramore and Portcullly (179).
- H. acuta**, Müll.—N.C. Youghal (188), Shanagarry (196).
W. Dungarvan (178), Tramore (179).

- Helix nemoralis**, Müll.—N.C. Milford and Charleville (164), Doneraile (165), Mallow (175), Fermoy (176), Macroon (185-186), Blarney (186), Middleton (187), Youghal (188), Shanagarry (196).
W. Mount Congreve (168), Cappoquin (177), Stradbally (178), Tramore and Portcully (179), Ardmore (188).
- H. aspersa**, Müll.—N.C. Milford and Liscarroll (164), Kanturk and Mallow (175), Castletownroche (176), Macroon (185-186), Middleton (187), Youghal (188), Cloyne (195), Ballycotton (196).
W. Portlaw (167), Mount Congreve (168), Aglish and Cappoquin (177), Lackendarra and Dungarvan (178), Portlaw and Dunmore (179), Ardmore (188).
- Cochlicopa lubrica**, Müll.—N.C. Charleville and Liscarroll (164), Kanturk and Mallow (175), Fermoy (176), Macroon (185-186), Middleton (187), Castlemartyr and Killeagh (188).
W. Mount Congreve (168), Portlaw (167), Cappoquin (177) Portcully (179), 6 miles north of Youghal (188).
- Cœcilianella acicula**, Müll.—W. 4 miles from Cappoquin on Waterford Road (177).
- Pupa anglica**, Fér.—N.C. Killeagh (188).
W. Cappoquin (177), Portcully (179).
- P. cylindracea**, Da Costa.—N.C. Liscarroll (164), Kanturk and Mallow (175), Castletownroche and Fermoy (176) Macroon (185), Blarney Castle (186), Middleton (187), Youghal (188), Shanagarry (196).
W. Mount Congreve and Waterford (168), Cappoquin (177), Dunmore (179), Ardmore (188).
- P. muscorum**, Müll.—N.C. Middleton (187), Youghal (188), Shanagarry (196).
W. Dungarvan (178), East of Youghal (188).
- Vertigo edentula**, Drap.—N.C. Macroon (185), Killeagh (188).
W. 6 miles north of Youghal (188).
- V. pygmæa**, Drap.—N.C. Mallow (175), Middleton (187).
W. Aglish (177), Tramore and Dunmore (179), north of Youghal (188).
- V. antivertigo**, Drap.—N.C. Buttevant (164), Middleton (187), Castlemartyr (188), Shanagarry (196).
W. Cappoquin (177).
- Balea perversa**, L.—N.C. Macroon (185), Killeagh (188).
W. Mount Congreve (168), Cappoquin (177).
- Clausilia bidentata**, Ström.—N.C. Liscarroll (164), Mallow (175), Macroon (185-186), Castlemartyr and Youghal (188).
W. Mount Congreve (168), Cappoquin (177), Stradbally and Dungarvan (178), Portcully (179).
- Succinea putris**, L.—N.C. Mallow (175), Fermoy (176), Macroon (186).
W. Cappoquin (177).

- Succinia elegans**, Risso.—N.C. Castletownroche (176), Killeagh and Youghal (188), Shanagarry (196).
W. Ardmore (188).
- S. oblonga**, Drap.—N.C. Mallow (175), and just south of River Lee near Macroom, (185).
- Carychium minlmum**, Müll.—N.C. Buttevant and Doneraile (164), Mallow (175), Castletownroche (176), Macroom (185-186), Middleton (187), Castlemartyr and Killeagh (188).
W. Mount Congreve (168), Cappoquin (177), Portcullly (179), Ardmore (188).
- Alexia denticulata**, Mont.
W. Dungarvan (178).
- Limnæa peregrina**, Müll.—N.C. Milford, Charleville, and Doneraile (164), Fermoy (176), Macroom (185-186), Cork and Middleton (187), Youghal (188), Cloyne (195), Shanagarry (196).
W. Waterford (168), Cappoquin (177), Stradbally (178), Tramore (179), Ardmore (188).
- L. palustris**, Müll.—N.C. Milford and Liscarroll (164), Mallow (175), Fermoy (176), Macroom (185-186), Middleton (187), Youghal (188), Shanagarry (196).
W. Waterford (168), Cappoquin (177), Portcullly (179).
- L. truncatula**, Müll.—N.C. Milford and Charleville (164), Middleton (187), Youghal (188).
W. Cappoquin (177), Ardmore (188).
- Physa fontinalis**, L.—N.C. Liscarroll and Buttevant (164), Mallow (175), Fermoy (176), Cork and Middleton (187), Youghal (188), Ballycotton (196).
W. Waterford (168).
- Aplexa hypnorum**, L.—N.C. Fermoy (176), Middleton (187), Youghal (188), Shanagarry (196).
W. Waterford (168), Ardmore (188).
- Planorbis marginatus**, Drap.—N.C. Mallow (175), Fermoy (176), Youghal (188), south of Middleton (195), Ballycotton (196).
W. Mount Congreve and Waterford (168).
- P. spirorbis**, L.—N.C. Fermoy and Castletownroche (176), Macroom (186), Middleton (187), Youghal (188), Shanagarry (196).
W. Waterford (168), Cappoquin (177), Stradbally (178), Ardmore (188).
- P. contortus**, L.—N.C. Liscarroll and Buttevant (164), Mallow (175), Castletownroche and Fermoy (176), Macroom (185-186), Youghal (188).
W. Mount Congreve (168).
- P. albus**, Müll.—N.C. Buttevant (164), Macroom (185-186), Carrigtwohill and Middleton (187).
- P. glaber**, Jeff.—W. Cappoquin and Cappagh (177).
- P. cristata**, L.—N.C. Youghal (188).
W. Ardmore (188).

- Planorbis fontanus**, Light.—N.C. Fermoy (176).
Ancylus fluviatilis, Müll.—N.C. Liscarroll (164), Mallow (175), Castletownroche (176), Macroom (185-186), Killeagh and Youghal (188).
W. Mount Congreve (168), Portcullly (179), Ardmore (188).
Acme lineata, Drap.—N.C. Macroom (185), Killeagh (188).
Bythinia tentaculata, L.—N.C. Buttevant (164), Mallow (175), Fermoy (176), Midleton (187), Ladybridge (188), Shanagarry (196).
W. Mount Congreve and Waterford (168).
Hydrobia ulvæ, Penn.—N.C. Midleton (187), Youghal (188), Shanagarry (196).
W. Near Youghal (188).
H. Jenkinsi, Smith.—N.C. Ballycotton (196).
W. Waterford (168), Cappoquin (177).
Valvata piscinalis, Müll.—N.C. Mallow (175), Castletownroche (176), Youghal, (188), Shanagarry (196).
W. Cappoquin (177).
V. cristata, Müll.—N.C. Doneraile (164), Castletownroche (176), Youghal (188).
Sphærium corneum, L.—N.C. Liscarroll (164), Killeagh (188).
S. lacustre, Müll.—N.C. Mallow (175), Midleton (187), Shanagarry (196).
Plisidium pulchellum, Jen.—N.C. Doneraile (164).
P. nitidum, Jen.—N.C. Ladybridge (188).
P. fontinale, Pfr.—N.C. Doneraile (164), Mallow (175), Castletownroche (176), Carrigtwohill (187), Youghal (188).
W. Dunmore (179).
P. millum, Held.—N.C. Fermoy (176), Carrigtwohill (187), Killeagh (188), Shanagarry (196).
W. Tramore and Dunmore (179).
P. obtusale, Pfr.—N.C. Mallow (175).
P. pusillum, Gmel.—N.C. Fermoy (176), Mallow (175), Carrigtwohill and Midleton (187), Killeagh (188), Shanagarry (196).
W. Cappoquin (177), Portcullly (179).
Unio margaritifera.—N.C. River Sullane (185), River Lee (186).

Clondalkin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include three Green Toads from Dr. O'Donnell, a Horn-bill from Mr. D. A. Donovan, an African Leopard from Drs. Garland and Montgomery, a Grey Parrot from Miss L. Garland, three Algerian Geckos from Mr. H. B. Rathborne, two Hedgehogs from Mr. J. Rossiter, and a Hare from Mr. E. Horan. A Barbary Lamb has been born in the Gardens.

A new Rodent enclosure or "rockery" is in progress, and is now at an advanced stage. This enclosure is intended for the housing of the smaller Rodents, such as Guinea pigs, Rabbits, and the like. It is nearly circular in form and provided with numerous dens divided off by rocks, and a mass of rockwork, some six feet in height, forms a picturesque background. There will be plants such as stonecrops in variety growing in amongst the rocks, and when completely finished it will make a good and at the same time pleasant retreat for the specimens for which it is intended, whilst also adding to the already far too limited accommodation for the housing of the live stock of the Gardens.

DUBLIN NATURALISTS' FIELD CLUB.

JUNE 4.—EXCURSION TO WICKLOW HEAD.—A party of members and friends left Harcourt-street by an early train for Wicklow. F. O'R. Ellison, B.A., then led the excursion through the town to the lower slopes of Wicklow Head, and gave an account of the geological formation of the district, pointing out the very great extent of the dark gray micaceous slates which form the head. These slates dip to the N.E. at an average angle of 45 degs., and are developed to an immense extent in the district round Wicklow Head, there being a stratigraphical thickness of at least 5,000 feet. The slates are interstratified with numerous ash beds. After luncheon, the party divided into two sections, one walking along the cliffs to the lighthouse, near which some good examples of sea stacks and rock bridges are to be seen. The other section moved inland in search of botanical specimens. Miss Ryan, B.A., was elected a member.

JUNE 25.—GLENASMOLE.—Twenty-one members and visitors assembled at Oldbawn Bridge in the afternoon. The party, under the direction of F. O'R. Ellison, B.A., walked along the river Dodder to where the Rathmines waterworks have submerged the valley under two large reservoirs. The conductor pointed out some of the interesting features of this valley. Glenasmole as a valley dates from pre-glacial times. The upper part is excavated in granite and the lower part in Silurian slates, and their associated basic intrusive rocks. During Glacial times this valley has been largely filled with Boulder-clay and stratified gravels. It is entirely

through these latter accumulations that the present bed of the Dodder River has been cut. The party on proceeding up the valley had an opportunity of viewing the bold heights which the Boulder-clay forms on the east side of the river, fifty to sixty feet over the floor of the valley being often reached. Large masses of gravel cemented into conglomerate by the action of water containing lime in solution were very conspicuous on the western side of the valley. By this time the party had reached Mr. O'Byran's Lodge, and were compelled to take shelter from heavy rain which commenced to fall. After tea an effort to reach the upper lake was made by the more adventurous of the party, but the continued rain made walking very difficult. The party then walked back to Tallaght, and returned to town by the steam tram. Mr. Felix E. Hackett, B.A., B.Sc., was elected a member.

NOTES.

ZOOLOGY.

The Manx Shearwater.

Crossing over to Belfast from Liverpool at about six o'clock on the morning of 18th June, and a mile or two south of Skullmartin Lightship, our steamer the "Caloric," passed through the largest company of Manx Shearwaters I ever saw. I saw the birds first about half a mile off, flying about irregularly back and forward in all directions; but, when we came into the middle of the company, to my surprise some of the birds appeared from below the surface, and flapped off a few yards before getting into their regular flight on finding the steamer so near them. Many of these birds were not more than ten yards from where I was standing on deck. I seemed to be looking right down on them, some of them coming to the surface not more than five to eight yards from the ship's side. There may have been from about 150 to 200 of the birds—certainly not less than the former number—and it was one of the most interesting, and indeed beautiful, sights of the kind I ever saw, for I know of no bird of more graceful flight and easy elegance of movement than the Manx Shearwater. The large number seen that morning, in a locality far removed from any breeding station of the species that I am aware of, is curious, as I should have supposed that the important family duty of feeding their young would have detained the majority of the birds nearer their nesting haunts than this till later in the season.

R. LLOYD PATTERSON.

Croft House, Holywood.



An Albino Blackbird.

On the 17th of June I was sent a young Blackbird, which was able to fly, and was shot in the garden of a parishioner of mine. It is absolutely white, without a spot of black or other colouring. I am sorry to say that the bird was too far gone to be preserved.

WILLIAM W. FLEMING.

Coolfin, Portlaw.

BOTANY.

A new locality for *Glyceria festucaeformis*.

An unfamiliar-looking grass gathered in July, 1903, south of Cloghey Bay, Co. Down, which at the time of finding showed no inflorescence, has recently flowered in my garden, and proves to be *Glyceria festucaeformis*. It grew in chinks of low slate rocks on the shore, which is here very rough and desolate, and at the time I took it for a robust form or variety of *G. distans*. It was a decidedly smaller, more compact plant than the Strangford Lough *G. festucaeformis*, which was discovered on the following day, but this was apparently the effect of habitat, as in the garden it has assumed the dimensions and appearance of the Strangford plant. Only a few plants were observed, but no search was made for more, as I did not at the time suspect such a rarity. This new locality lies on the outer or Irish Sea shore of the Ards peninsula, and is remote and primitive. The presence of the grass here strengthens the view which I have already expressed, that the plant is native in County Down; and there can be little doubt that close search will eventually reveal other stations.

R. LLOYD PRAEGER.

Dublin.

Trifolium striatum inland in Louth.

Miss Helen Kidd sends me a specimen of *Trifolium striatum*, which she gathered on rocky ground close to Mellifont Abbey, on June 27 last year. I was at Mellifont with the Belfast Field Club only a couple of days before receiving Miss Kidd's letter, and the high rough outcrop of Silurian slates there struck me as exactly the habitat for *T. striatum* and similar plants, but time did not allow of exploration. This spot is distant nine miles from the Irish Sea. The only other Irish station for the plant not on the coast, is Feltrim Hill, Co. Dublin, which, however, is within two miles of the shore. *T. striatum* is one of many plants which, while widely spread in dry inland situations in England and on the Continent, are in Ireland nearly or wholly confined to the coast.

R. LLOYD PRAEGER.

Dublin



Drawn by Joseph Carey from a Sketch by Fraulein Magnussen.

BEN WHISKIN FROM BALLAGNATRILICK.

To face p. 173.]

IRISH FIELD CLUB UNION.

REPORT OF THE

FOURTH TRIENNIAL CONFERENCE AND EXCURSION,

HELD AT SLIGO, JULY 12TH TO 18TH, 1904.

I.—GENERAL ACCOUNT.

By R. LLOYD PRAEGER, B.E.,

Hon. Secretary, Irish Field Club Union.

Sligo was the centre selected for the fourth triennial conference of the Irish Naturalists' Field Clubs. The centres of previous conferences were Galway, 1895; Kenmare, 1898; and Dublin, 1901. Full accounts of the proceedings at these meetings, and of the scientific results obtained, appeared in the *Irish Naturalist* for September, 1895, September, 1898, and July, 1901. Sligo was chosen for the 1904 meeting as offering a charming variety of ground to the naturalist, and as possessing sufficient hotel accommodation for the housing of a large party. The County of Sligo fringes one of those deep indentations of the west coast of Ireland, which generally coincide with the substitution of Carboniferous limestone for the older metamorphic series. On the one hand the great buttress of Mayo, on the other hand that of Donegal, projects far into the ocean. The coast-line of Sligo is broken by several long sandy inlets, the mouths of which are half blocked by islands and reefs of limestone. Into one of these pours the River Garvogue, draining Lough Gill, which approaches at its western end to within two miles of the sea. Beside the ford which crossed the river, between the lake and the sea, the town of Sligo has grown up. From the point of view of the modern traveller, the position is a commanding one. Westward lie the promontories, creeks, and islands of Sligo Bay; northward, the imposing mountain mass of Ben Bulbin, formed of flat-topped limestone hills. Eastward, Lough Gill lies set in hills and woods of exquisite beauty. Southward and south-westward lie other mountains, representing a very ancient fold, through a gap in which the combined railways from Dublin, Enniskillen, and the South find their way northward to Sligo town. The port accommodates steamers of very considerable tonnage, and the principal part of the carrying trade is done by sea.

TUESDAY, JULY 12.

The Belfast section of the party, numbering thirty, left Great Victoria-street at 9.50, and the greater part of the Dublin contingent, which numbered fifteen in all, left Amiens-street at 9.0, accompanied by the

single representative of the Cork Club. The two parties joined forces at Clones, and from Enniskillen proceeded by special train, arriving in Sligo shortly after 2.0. The Limerick section, eleven in number, had arrived a few minutes earlier. The Imperial Hotel was the head-quarters of the party during the week, while the overflow was well accommodated in the Bridge House Hotel adjoining. At 3.0 the combined party, reinforced by members who had arrived separately, and numbering in all sixty-one, started in brakes, with an advance guard of cyclists, for Rosses Point.

Rosses forms a peninsula with a square end, which is occupied by a sandy beach buttressed with rocks at either extremity. Behind the beach lie sand-dunes, then a stretch of marshy ground with two shallow lakelets, and then hummocky rocky country formed partly of limestone and partly of mica-schist, with more lakelets. The Rosses promontory consists of a low ridge of metamorphic rocks, with limestone resting on both flanks. Magnesian limestone overlies the mica-schist on some of the ground which the party traversed.

On arrival, tea occupied the attention of the members for a short time. Then they proceeded to an eminence (185 feet) on the golf-links, where the Conductor (R. LL. PRÄGER) pointed out the leading features of the fine panorama of land and sea that stretched around, dealing in particular with the places to be visited during the meeting, almost every one of which was clearly visible from this outlook. The party then scattered for a few hours for work or pleasure, the vicinity of the lakelets proving especially attractive to the collectors. Here some interesting animals were obtained, notably the water-bug *Corixa Bonsdorffi*, a somewhat local species. The best plant observed was the Twisted-podded Whitlow-grass (*Draba incana*), an alpine abundant on the Ben Bulbin range, but which only occasionally descends to sea-level. Mr. J. White, junior, a local naturalist, arrived with fresh specimens of the Maidenhair (*Adiantum Capillus-Veneris*), which he had collected *en route* on the shore on the north side of the Rosses promontory. Col. Wood-Martin, D.L., who accompanied the party during the afternoon, was invaluable in supplying information concerning local history and archæology. At 7.30 the return journey to Sligo was made. In the evening, and on each succeeding evening during the trip, members assembled in the Town Hall, where, by the kindness of the Mayor (Mr. Thomas Flanagan), a fine room was placed at their disposal for natural history work.

WEDNESDAY, JULY 13.

Heavy rain had fallen during the night, laying the deep dust of the day before. The sun came out as the party started northward in brakes at 9.0. A halt was made at Drumliff, to examine the antiquities there. The high cross is considered one of the finest of the sculptured tall crosses of Ireland. The round tower stands close to the crosses on the opposite side of the road, but little except a stump now remains. This round tower is placed by Miss Stokes in the first or earliest style of towers, being built of "rough field stones untouched by hammer or chisel,"



ENTRANCE INTO LOUGH GILL.
Showing the range of metamorphic hills on the southern shore.

Thence the route lay westward, through the village of Carney and the beautiful demesne of Lissadill, to the remote district of Raghly, where a halt was called beside the gaunt ruins of Ardtermon Castle. Thence the Yellow Strand stretches for over a mile—a broad belt of sand backed by a grand pebble-beach, behind which are dunes and wide expanses of sandy and stony ground. At the western end of the beach, the isolated green hill of Knocklane (189 feet) rises right over the Atlantic. The members were soon widely scattered over the strand and grassy downs. On the rocky shores, great abundance of two characteristic western animals, the Purple Sea-urchin (*Strongylocentrotus lividus*), and the mollusc *Trochus lineatus*, were noted. Amongst insects perhaps the most interesting find was the variety *brevifasciata* of the ladybird *Coccinella xipunctata*. This variety would seem to be a distinctly northern insect. The downs were tenanted by a great profusion of the tiny Flax-seed (*Radiola linoides*), and the Red Goosefoot (*Ghenopodium rubrum*) subsequently found by Mrs. Leebody, represents an interesting addition to the flora of District IX. of "Cybele Hibernica." But the honours of the day fell to the archæologists, in the finding of numerous Neolithic flint implements, including an arrow-head, scrapers, and knives. After lunch at Ardtermon, some further time was available for collecting, and at 4.0 a return was made to Lissadill. Here the members were met by Sir Josslyn Gore-Booth, Bart., who directed them to the best grounds for collecting, and kindly threw open his gardens. After two hours spent among the woods and along the shores of Drumcliff Bay, the conductor's whistle sounded the recall, and the party left at 6.30 for Sligo.

In the evening the usual examination and preserving of specimens went on at the Town Hall. In the morning J. J. Andrew had offered a prize for the best collection of Flowering Plants made during the day. In the evening the judge appointed (Miss Knowles), examined and reported on this competition. Five collections were sent in, and the prize was awarded to Miss Helen Kidd, whose collection numbered 170 species.

THURSDAY, JULY 14.

At the Riverside, boats were in readiness at 9 o'clock, and a start was made up the river for Lough Gill. The morning was dark and stormy, and the wind rapidly increased as the day advanced; it was after a long and arduous hour and a half of rowing that Doonee Rock, the first halt of the day, was reached. As the wind remained very high, it was decided to make this sheltered and beautiful spot the head-quarters for the day, and to reach Rockwood by walking, instead of by rowing, in the afternoon. The forenoon was profitably spent along the shores of Lough Gill and among the woods. Just after lunch, a heavy shower—the only heavy rain experienced during the whole week—burst over the lake, and when after half an hour the clouds at length broke, and the sun streamed out gloriously, the sheets of rain had so drenched the members that about a third of the party elected to work back into Sligo by road. The walk

was most enjoyable, the colouring of land and water being of those dazzling hues only seen after rain in the West; and before Sligo was reached the high wind and strong sun had thoroughly dried all wet clothes. The opportunity was taken of visiting the famous holy well of Tobernault, and other antiquities lying on the line of route. Meanwhile the main body also divided, one section remaining about Doonee Rock, while the others walked round the lake-shore to Rockwood, where a couple of hours were spent in this old native forest of Oaks. The evening turned out beautifully fine, and the row back to Sligo was most enjoyable.

The country about Doonee and Rockwood, with its thick covering of native wood, proved highly productive; but the high wind rendered useless any attempt at finding the rarest insect recorded from this neighbourhood—namely, the Mountain Ringlet butterfly (*Erebia epiphron*). The best plant seen was the Yellow Bird's-nest (*Monotropa Hypopithys*), of which two small specimens were found during the last few minutes at Doonee Rock, where one specimen had been previously obtained by Mr. Colgan in 1896. The entomologists made some interesting discoveries. The rare Arctic ground-beetle *Pelophila borealis* proved quite common under stones at the edge of the lake. These stones were also the home of numerous springtails, and among several common kinds a single example of a North European species (*Xenylla brevicauda*), hitherto unknown in the British Islands, was of especial interest. The Holly-boring Weevil, *Mesites tardyi*, occurred under decaying fir trunks at Doonee Rock. In addition to other interesting species a new British water-mite, *Arrhenurus Moebii*, was secured in pools on the shore of the lake. In the same locality *Corixa Germari* was not uncommon, this being apparently the first record of the species from Ireland.

A prize offered by Mr. Jaffé for the best collection of hydrophytes made during the day was in the evening awarded to Miss Effie M'Intosh, who showed 21 species—not a very large number, but a more unfavourable day for collecting water-plants could not be imagined.

FIELD CLUB CONFERENCE.

On Thursday evening, at 8.30, a Conference was held on matters relating to Field Club work. The chair was taken by W. J. FENNEL, M.R.I.A.I., President of the Senior (Belfast) Club.

The CHAIRMAN, in opening the meeting, welcomed the members of the various Clubs, and also the local friends who had shown their interest in the proceedings of the Union by attending that evening. He mentioned that the Field Club Union represented a membership of about 850 persons interested in natural science and in archæology, resident in every part of Ireland, and combined into four clubs—with their headquarters in Belfast, Dublin, Cork, and Limerick respectively. The Field Clubs represented a body of opinion of considerable weight, and had frequently made their voice heard, especially in the matter of saving from



A HALT IN GLENCAR.

W. J. Fennell, Photo.



THE USUAL MODE OF TRANSPORT IN SLIGO.

W. J. Fennell, Photo.

destruction ancient, monuments, or getting them repaired or restored. In this direction he thought the Board of Works had often not shown sufficient initiative or energy.

He read a telegram from William Gray, M.R.I.A., wishing success to the Conference, and then called on the Secretary to introduce any formal business.

R. LLOYD PRAEGER, Hon. Sec. I.F.C.U., said there was no official business to come before the meeting. The especial object of the Conference was to furnish members with an opportunity of discussing matters in which all the clubs were interested.

Prof. JOHNSON SYMINGTON, M.D., F.R.S. (Ex-Vice-President B.N.F.C.), introduced the question of the present condition of the National Museum in Dublin as regarded staff and income. He pointed out what a great assistance the existence of this Museum was, not only to Dublin workers but to workers in all parts of Ireland: and instanced assistance rendered to Cork, Belfast, and Londonderry. During the last twenty-five years, while the staffs of other Government institutions had been increased more or less in proportion to the increase of work devolving upon them, the staff of the Dublin Museum had actually been diminished by the partial withdrawal of one officer. He was glad to see lately letter from a number of distinguished Irish naturalists, calling attention to the state of affairs, and he moved:—

“That this meeting of the Irish Field Club Union expresses cordial approval of the letters on the Dublin Natural History Museum that have lately appeared in the Irish Press: and urges on the Department of Agriculture and Technical Instruction the necessity for placing the staff and equipment of the Museum on a satisfactory basis, and thus rendering possible an extension of the valuable work done by that institution for naturalists throughout Ireland.”

W. F. DE VISMES KANE, M.A., D.L., M.R.I.A. (Ex-President D.N.F.C.), seconded the resolution. He referred to the great and continual assistance rendered by the Museum staff to the Field Clubs, and the Field Clubs, he said, provided the raw material out of which the scientific men of the country were produced. The crying want of the Museum was the fact that the staff was quite inadequate for the working out of the valuable material which kept pouring into that institution, and the whole country suffered thereby.

ROBERT WELCH (B.N.F.C.), supporting the resolution, bore eloquent testimony of the value of the Museum staff and its collections to naturalists in Belfast.

DR. GEORGE J. FOGERTY (Hon. Sec. L.F.C.), on behalf of the Limerick Club, strongly endorsed the statement made by Mr. Welch.

The resolution was passed unanimously.

W. F. DE V. KANE drew the attention of members to the presence of rare blind Crustacea in the subterranean waters of Ireland. Caves and deep wells in particular needed exploration, and he hoped members would examine underground waters when opportunity offered.

W. H. PATTERSON, M.R.I.A. (Ex-President B.N.F.C.), wished to call the attention of all members present to the *Irish Naturalist*, a journal run, not for profit, but at considerable loss, for the encouragement of natural history pursuits in Ireland. He thought all members of the Field Clubs should make a point of subscribing to it, and, if possible, of contributing to its pages.

The CHAIRMAN endorsed Mr. Patterson's remarks, and complimented the Editors, two of whom had given their services to the Journal since it was founded over twelve years ago.

R. LLOYD PRAEGER said he thought this meeting should not close without a word of congratulation to their veteran fellow-member, Mr. Samuel Alexander Stewart, A.L.S., on the recent recognition by His Majesty's Government of his service to science by making him a grant from the Royal Bounty Fund. He moved—"That this meeting of the combined Field Clubs of Ireland desires to offer to Mr. S. A. Stewart, A.L.S., its warm congratulations on the recognition recently recived from His Majesty's Government of the great value of the scientific work to which he has devoted his long life."

The CHAIRMAN said that such a resolution needed no seconding. He put it to the meeting and it was carried amid applause.

Mrs. FENNELL (B.N.F.C.), advocated the diffusion of elementary science, and especially of botany and horticulture, among the masses. A little knowledge of plants and how they grew was most beneficial. She wished Irish people could be taught to keep gardens. Tidy gardens would also lead to tidy houses, and cleanliness of house and person was still a desideratum in parts of Ireland. She appealed to Mr. Praeger to say how the knowledge of botany possessed by the few might be transmitted to the many.

R. LLOYD PRAEGER said Mrs. Fennell had set him a difficult question. No one be more pleased than himself if the political cry of Ireland in the near future was "Cleanliness and Botany." He thought that Mr. Carpenter, who had recently been engaged in the Department of Agriculture's schemes for the extension of scientific training, might be able to give some information on the subject.

G. H. CARPENTER, B.Sc., M.R.I.A. (Ex-President D.N.F.C.), described the work now being done in the Royal College of Science for Ireland in the training of science teachers, and also spoke of the Department's arrangements concerning agricultural instructors.

The proceedings then terminated.

FRIDAY, JULY 15.

Again a bright morning after a heavy night's rain. Starting in brakes at 9.0, the route lay northward to where the huge grey cliff-gates of Glencar rise a thousand feet on either hand. In the glen, the road dipped rapidly to Glencar Lake, at the upper end of which the day's rendezvous was established. Glencar waterfall was first visited,



Dr. G. Fogerty, Photo.

GLENCAR.

Looking west from near the Waterfall.



C. Baker, Photo.

GLENCAR.

Looking west towards the Swiss Valley.

and, on account of the heavy rain of the preceding night, it was seen to quite unusual advantage. Then the members scattered along the slopes and lake-shores. Dredging and tow-netting operations were carried out in the lake, where the local water-beetle, *Agabus guttatus*, was taken; and the woods were thoroughly explored. One member brought down specimens of the Maidenhair (*Adiantum Capillus-Veneris*) from the cliffs west of the fall. (Plate 7.)

Lunch was ready at 1.0 on the lake-shore, and then the majority of the party proceeded to the "Swiss Valley." This is a deep rift at the foot of an enormous cliff of limestone, the lower side of the ravine being richly wooded. (Plates 6, 8.) Here some of the party, to the number of fourteen, started up a zig-zag path to cross the high boggy plateau to Annacoona, to see *Arenaria ciliata* in its only British habitat, and study the alpine flora of the higher grounds. For the remainder of the party, the woods, cliffs, and lake of Glencar provided ample attractions. At 6.0 the main body started for home, and half-an-hour later the mountaineers were duly picked up at the lower end of the lake.

Rev. Father Meehan, C.C., of Drumkeeran, who joined the party on this day, contributed much information concerning the antiquities and history of Glencar and neighbourhood.

In the evening the scientific proceedings in the Town Hall were suspended early in favour of dancing.

SATURDAY, JULY 16.

Starting at 9.0, a pleasant drive brought the members to Carrowmore, where, under the guidance of Mr. Alex. MacArthur, the more striking of the numerous prehistoric monuments of this remarkable spot were inspected. From here to the sea the area seems to have been literally covered with carns, cromleacs, and stone circles, like a great necropolis. Many of the party entered the sepulchral chamber of one, the entrance having been made easy by a local contractor some few decades ago, who carted away the stones that covered it, being paid 1s. 6d. per load for them. It is to be hoped that we have heard the last of such bargains. Mounted on a cromleac, W. F. de V. KANE, in a short address, dealt with what is known concerning the construction and significance of these rude stone monuments. It was noted that these cromleacs are composed almost entirely of erratic blocks, apparently mainly derived from the metamorphic hills to the southward. Similar large erratics occur all over the Knocknarea promontory. On the resumption of the drive, the party were joined by a local contingent, including Mr. Owen Phibbs, of Lisheen; Miss Cochrane, of Glen Lodge; and Mrs. Crichton, of Carrowgarry. Under their guidance, an ancient church adjoining Seafield was visited, and then an entry was made into the remarkable Knocknarea Glen, through the grounds of Glen Lodge. This ravine runs along the hillside for over a mile, and has vertical sides of limestone. The whole is densely wooded, and in the shade myriads of very large Harts'-tongues (*Scolopendrium vulgare*) grow. (Plate 10.)

Lunch was served at 1.0 by the shore below Glen Lodge. Subsequently the party divided. About one half ascended past the end of the glen to climb Knocknarea, while the others kept westward along the road, under the great cliff-wall of Knocknarea, towards Strandhill, where, on the shore, a rare beetle of southern range, *Bryaxis Helferi*, occurred under stones, an addition to the Connaught records. A harvestman of a species (*Phalangium saxatile*), hitherto known in Ireland only from County Dublin, was also discovered near the beach. The mountain party had an enjoyable time, not marred by a misty shower that slowly drifted across from the Ox Mountains. It cleared off as the summit (1,078 feet) was reached, allowing a glorious view of all the surrounding country, from Nephin and Keshcorran northward to Rathlin O'Byrne. The gigantic cairn which crowns the hill measures about 80 feet across the top, and is 34 feet high, and occupies one of the most commanding sites in the county. The position is worthy of being the resting place of the Boadicea of Ireland, Queen Maev of Connaught, round whose life legendary lore has weaved many a delightful fairy tale—while Shakespeare has completed the charm with her as Mab, the Fairy Queen of Mercutio in "Romeo and Juliet." Descending the steep western side of the hill, the two sections reunited on the extensive sand dunes below Strandhill. The clear Atlantic water proved an irresistible attraction, and for a time bathing and wading were the order of the day. Then, after a cup of tea at Strandhill, the return drive was commenced. On the way the house was pointed out where the coronation chair of the O'Neills was kept in a garden rockery for many years. It is now in the Belfast Museum. Sligo was reached punctually at 7.0.

In the evening a general exhibition of the scientific results of the excursion was given in the Town Hall. In addition to the whole party, a large number of local friends attended, and from 8.0 till 10.30 the room presented a very animated appearance. Towards the close of the evening the Chairman of the Conference (W. J. FENNEL, President B.N.F.C.), mounting the platform, made a few valedictory remarks. He especially dwelt on the friendly and hospitable reception that the party had received from the residents of Sligo and neighbourhood. On behalf of the Clubs, he returned hearty thanks for kindnesses conferred, and he especially mentioned the names of the Mayor of Sligo, by whose kindness they had met each evening in that room; of Sir Josslyn Gore-Booth, Capt. Owen Wynne, Col. Wood-Martin, Mr. Owen Phibbs, Miss Cochrane, Mr. Alex. MacArthur, and Mr. White; also to the members of the Constitutional Club, for admitting the party to the club as visitors during their stay in Sligo. He went on to speak of the arrangements and management of the excursion, and proposed a vote of thanks to the Secretary.

W. F. DE V. KANE seconded the motion, which was spoken to by John Jaffe on behalf of the visitors, and Mrs. Henry Thompson on behalf of the ladies of the party. The motion was passed.

R. LLOYD PRAEGER briefly replied.

The CHAIRMAN announced the judges' decision with regard to the prize which he had offered for the best find made during the excursion.



GLENCAR WATERFALL.

40 feet high, showing the cirque cut in the Carboniferous limestone.

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The Committee appointed to adjudicate awarded the palm to Dr. A. D'Evelyn for his discovery of the remains of Neolithic man among the sands of Raghly.

Shortly after the meeting broke up.

SUNDAY, JULY 17.

There was no fixed programme for this day, but a great deal was done and seen. At 10.0 a.m., W. J. FENNEL, conducted the majority of the party to Sligo Abbey, the picturesque ruins of which are situated close to the hotels, and under his skilled guidance the various points of interest were demonstrated.

Another party spent a long day in Gleniff, exploring the great cavern known as Dermot and Grania's bed. The cave has an entrance of enormous width, which forms a conspicuous land-mark near the top of the precipitous scarp on the south side of the valley, towards the head of the glen. The climb to it is steep, but not dangerous. The floor and roof of the cave slope steeply upwards as one enters. The main chamber is short, and opens into widely diverging passages to the right and left. That on the right is the larger, and contains on its right-hand side a remarkable narrow fissure of great height, with a floor which descends precepitously for some distance. The floor of the whole cave is exceedingly irregular. The passage on the left-hand side of the main chamber is short. A branch of it, with a remarkably level floor, runs out to the cliff face, and opens thereon by a tolerably large arch. On this expedition the zoologists were specially successful. The Whinchat, an extremely local bird, was watched for some time, and about the cave the rare snail *Helix arbustorum* was found in abundance.

A small party of zoologists and botanists spent the day in the woods by the river above Ballysadare, where a number of interesting plants and animals were obtained.

Other members of the party visited Dromahaire and its interesting ruins, where they were fortunate in having the guidance of Father Meehan. Lough Gill, the demesne of Cleveragh, Cairns Hill, and Tobernault also came in for a share of attention.

MONDAY, JULY 18.

On this morning the party broke up. The majority of the Belfast and Dublin members left by the 10.5 train for Enniskillen, where, on arrival, they were most hospitably entertained by Mr. Thomas Plunkett, M.R.I.A., and Mr. W. N. Tetley, of Portora Royal School. At the end of an hour the journey was resumed. The Limerick party left Sligo a couple of hours later. Other members branched off to various parts of the west coast. Mrs. and Miss Leebody went to Rosses Point, and during the week found some interesting plants, which are included in the botanical results of the excursion given on a subsequent page.

II. ZOOLOGY.

VERTEBRATA.

BY ROBERT PATTERSON, M.R.I.A., and NEVIN H. FOSTER, M.B.O.U.

Naturally Birds were more in evidence than other Vertebrates. Pipistrelles were the only Bats recognised: they were seen every evening. Hares were seen at Lissadill at practically sea-level; Rabbits were numerous, and natives reported Foxes and Badgers as being not uncommon in the mountains.

Seventy species of Birds were noted during the six days of the excursion, none of them being an addition to those recorded for the district, and 246 observations were made. The average number of species seen each day was 41 (the numbers ranging from 37 to 44), but it must be borne in mind that several of the days were stormy and unfavourable for ornithological observation, and also that at this season many of the species were moulting, and consequently keeping secluded. Space will not permit of the full list being given, but the following are among the more interesting notes made:—

The Mistle Thrush (*Turdus viscivorus*), was only seen twice until the 17th, when a flock of about twenty was observed on the mountains at Gleniff. Song Thrushes (*T. musicus*), and Blackbirds (*T. merula*), were remarkably scarce, and the Ring Ousel (*T. torquatus*), was only seen at Gleniff. A pair of Whinchats (*Fringilla rubetra*), evidently breeding, was seen in a meadow at Gleniff, but strange to say only one Stonechat (*P. rubicola*), was observed during the week.

One Dipper (*Cinclus aquaticus*), was seen on the river coming down from Glencar waterfall, and Long-tailed Tits (*Acredula caudata*) and Great Tits (*Parus major*), only once, while the Blue Tit (*P. caeruleus*), though observed on five days, was by no means common. Pied Wagtails (*Motacilla lugubris*), were noted on two days, and Grey Wagtails (*M. melanocephala*), on three; Spotted Flycatchers (*Muscicapa griscola*), were fairly numerous, and all the Hirundinidæ were common. Goldfinches (*Carduelis elegans*), were noted in two days, and large flocks were seen at Gleniff. Chaffinches (*Fringilla cælebs*), Linnets (*Linota cannabina*), and Lesser Redpolls (*L. rufescens*), were decidedly scarce, and only two pairs of Bullfinches (*Pyrrhula europæa*), were seen. The Corn-Bunting (*Emberiza miliaria*), was plentiful in the neighbourhood of Strandhill, the Yellow Bunting (*E. citrinella*), common everywhere, and the Reed Bunting (*E. schœniclus*), noted on three occasions. Choughs (*Pyrrhocorax graculus*), were seen at Gleniff, and heard at Knocknarea Glen, and the Hooded Crow (*Corvus cornix*), was observed once. The Kestrel (*Falco tinnunculus*) was the only bird of prey noted on five days. Among the *Anatidæ*, the Mute Swan (*Cygnus olor*), was seen on five days in different localities, upwards of twenty birds of this species frequenting the river near the bridge in Sligo;

the Mallard (*Anas boscas*), was noted on three days, one male Tufted Duck (*Fuligula cristata*), was observed on Lough Gill, and several adult and about thirty young Red-breasted Mergansers (*Mergus serrator*) on the same lake.

The Red Grouse (*Lagopus scoticus*), was only seen once, but it must be remembered that the ground traversed is almost destitute of heather. Moorhens (*Gallinula chloropus*), and Coots (*Fulica atra*), were remarkably scarce, and only one Woodcock (*Scolopax rusticula*), was seen, but this species was reported to nest in the vicinity by several local people. The Common Tern (*Sterna fluviatilis*), was plentiful on Lough Gill, and the Black-headed Gull (*Larus ridibundus*), everywhere, but the Common Gull (*L. canus*), and Herring Gull (*L. argentatus*), were only seen a few times, while no Lesser Black-backed (*L. fuscus*), Great Black-backed (*L. marinus*), nor Kittiwake Gulls (*Rissa tridactyla*), were noted. The Little Grebe (*Podiceps fluviatilis*), was only observed on one of the lakes at Rosses Point.

Several specimens of the Viviparous Lizard (*Lacerta vivipara*), and the Common Frog (*Rana temporaria*), were seen close to the summit of Anna-coona. One of the Lizards was captured uninjured, and was exhibited at the conversazione on 16th July, where it attracted much attention. It accompanied the Dublin contingent on the return journey, and was placed in quarters at Rathgar. Mr. W. F. Gunn informs us that on the 29th July it gave birth to a family of young, which, however, owing, no doubt, to the vicissitudes of the mother's journey and confinement for several days in a vasculum, were born dead. It is now (August 6th) in excellent health, and apparently quite happy in a large bell-glass.

Belfast.

MOLLUSCA.

LAND AND FRESHWATER MOLLUSCA.

BY R. WELCH and A. W. STELFOX.

A GLANCE at Sheets 43, 54, and 55 of the one-inch Ordnance Survey map of Ireland, will show what a variety of collecting ground there is within a radius say of 8 miles from Sligo. This circle will include all Lough Gill and the mountainous Gleucar, more limestone areas between Sligo and Ballysadare Bays, and tracts of coast sandhills. Many old woods and damp glens are included also, affording a molluscan fauna every chance of survival, even should Sligo become in the future a much more highly cultivated county than it is at present. We had long looked forward to a visit, to continue our exploration of the district commenced in 1900 (with a short visit in 1899), when we spent several days

in the month of September with Messrs. G. W. Chaster and E. Collier, walking, driving, and boating about Sligo. As the Conference excursions were fortunately arranged for localities different to those visited in 1900—with the exception of a small area in Carrowmore and the lake shores in Glencar—we looked forward to an extended list. More especially we wished to see how far a parallel could be drawn between the well-known alpine or northern character of the Sligo flora and its mollusca. Certainly our list shows a distinctly more northern facies than the West Galway list of 1895,¹ though the two areas are not far apart. To a certain extent this also applies to the Kerry list of 1898.² It may be that species absent or scarce in West Galway (and we worked a much larger district than in Sligo) may owe their presence in Kerry to the number and extent of the old native woods, and to the same cause in Sligo. The latter has damp glens with a most luxuriant vegetation—such as the minor glens along the cliffs in Glencar—deeply worn in the limestone uplands. This mountain area has, mainly at high altitudes, many crevices, rifts, and channels worn along the bedding and joint planes by water-action. These provide, as we had abundant proof of in the case of the *H. arbustorum* at the cave in Gleniff, more favourable habitats at all altitudes than the glaciated mountains (quartzites, granites, &c.), and great bog-areas of Connemara could do. If we take our 71 species as a basis, with the additional 8 found by Miss Amy Warren in the western part of Sligo (*Zoologist*, 3rd ser., iii, 1879, p. 25), we get in all about 79 species. Taking the Kerry and Galway lists, to which we add some additional species recorded in this Journal, or in Taylor and Roebuck's list,³ we get 66 species from Kerry and 62 from Galway West. This includes Lough Corrib shores, but not the Clare or the Shannon finds. Comparing now the three areas, we find about 43 species common to all; and that Sligo (including the small area of Leitrim we visited) has the largest number of species peculiar to itself. On the whole the fauna is more comparable with Kerry than with Galway, or any of the central counties, but we think it more nearly approaches the fauna of the north-east of Ireland (Antrim and North Down), owing to the presence of more species which have a northern or eastern range in Ireland. This may be due to similar little havens of refuge.⁴ Sligo and Leitrim have two species, however, not found in Antrim or Down so far, *Neritina fluviatilis* and *Planorbis vortex*. The former has a western range. Glencar Lough seems to be its most northerly habitat in Ireland. The second seems to have its headquarters in the larger lakes of Sligo, Cavan, Leitrim, and Fermanagh. The absence of one or two western species will be noticed in our list, such as *Hyalinia excavata*; some eastern, such as *Limnaea stagnalis*, were common locally; others, like *Buliminus obscurus*, rare *Planorbis contortus*

¹ *Irish Nat.*, iv., Sept., 1895.

² *Id.*, vii. Sept., 1898

³ *Proc. R.I.A.*, ser. 2, iv., 1888 p. 672.

⁴ See p. 121, *ante*.



THE SWISS VALLEY, GLENCAR.
Looking east.

fairly well distributed, and common. *P. glaber*, another eastern species, we did not find, but Miss Warren gives it in her list. Such distinctly northern or alpine species as *Helix arbustorum*, which is found as high as 7,000 feet in the Alps, and *H. lamellata* assist in giving a northern character to the fauna. In addition to lists mentioned, P. H. Grierson gives (*J. Nat.*, vol. x., 1901, p. 110), records for other parts of Leitrim. Our 1900 visit included Lough Gill, Dromahaire, Carrowmore, Collooney, and Ballysadare, Drumcliff, Streedagh Point sand-hills, and the island of Inishmurry. On one day G. W. Chaster and E. Collier visited Glencar, where they collected 49 species, partly in Sligo, but mainly well over the Leitrim boundary. We confined our attentions strictly to Leitrim on this present visit, both in the low ground round the eastern end of the lake and in the Swiss Valley (Plate 8). Those who climbed the mountain may have collected in both counties *A. ater* and *H. nemoralis*. We distinguish the records from the former visit, where we did not repeat them, as "Glencar 1900," for Leitrim, or "Glencar (Sligo)."

On the slopes and in little hollows at base of the large dune at Strand-hill we found many small "pockets" of wind-collected land-shells. These were sieved on the spot, and yielded a fair number of *Vertigos*, *Acme*, &c. In the wind-eroded sand-valley south of the dune we noticed a broken-up mass of firmly consolidated sand. This we would have passed, as such calcretes are common in some more northern sandhills, but for the fact that it contained a number of land-shells, including *Helix nemoralis* (see Plate 9), *H. hispida*, and *Cochlicopa lubrica*. Such modern sandstones may be seen to perfection in the course of formation in the Rosguill Peninsula, North Donegal, where the shallow pools on the great sand-flat of Tranarossan dry up frequently in dry weather, depositing the lime held in solution among the sand grains. As at Rosguill, the Sligo sands are partly composed of finely comminuted shells. An instance like this is of interest in showing one way in which even great masses of sandstone may have become consolidated with their fossil remains in past ages. We found another little instance too of "the testimony of the rocks" being stored up, it may be for future ages, the tufa (Plate 12) forming in Knocknarea Glen, was rapidly enclosing some small *Helices*, *Hyalinæ*, and *Cochlicopa*.

The weather was not good for collecting, much too dry and hot. Even the rain at night did not seem to affect matters. In this respect—dry hot days—we certainly had the Galway and Kerry experiences over again. Many members of the party handed us shells from time to time, and we have to thank Messrs. Gallway, Gunn, Baker, and Foster for handing over a box of finds almost daily.

On careful consideration, partly for convenience of reference to almost all Irish lists of past 12 years, we adopt Dr. Scharff's nomenclature as given in this Journal, vol. i., 1892. We know that Dr. Scharff has for some years past considered a revision of this advisable, and has the work in hands; but, in the meantime, we prefer to use it rather than the lately published revision of the Conchological Society. The varieties are as given in Adams' Manual, 2nd Edition, 1896.

LIST OF SPECIES.

- Vitrina pellucida**, Müll.—Generally distributed, but not plentiful, dead shells only.
- Hyalinia cellaria**, Müll.—Sparingly over the district during both visits, partial to old graveyards; Inishmurry. The fine specimens, some 12.75 mm., from Glencar prove to be the large non-typical form, with dark cobalt or indigo animal, often mistaken for *H. Draparnaudi*. It is common in parts of Lancashire, the Isle of Man, and especially so in the glens near Ballycastle, Co Antrim (see Adams, *I.N.*, March, 1898). Mr. J. W. Jackson kindly compared them with special collections of typical *H. Draparnaudi* in Manchester for us.
- H. alliaria**, Miller.—Rare everywhere; Rosses Point, Raghly, Rockwood, Glencar, Church Island, Dromahaire, Inishmurry. The greenish variety not noted anywhere.
- H. nitidula**, Drap.—More abundant than the two last. Rosses Point, Drumcliff, Lissadill, Raghly, Glencar, Rockwood, Inishmurry.
- H. pura**, Alder.—Fairly common among *Hyppnum* in suitable situations, usually the var. *nitidosa*; a few of the type at Rosses Point, Rockwood, and Swiss Valley.
- H. radiatula**, Alder.—Rosses Point, Rockwood, Glencar, Church Island. The var. *viridescens-alba*, so common in Kerry and Antrim, was noted only at Glencar.
- H. crystallina**, Müll.—The most abundant of all the *Hyalinia*, but not met with on Inishmurry. Common in the shell pockets.
- H. fulva**, Müll.—Decidedly rare; Rosses Point, Raghly, Rockwood, Swiss Valley, Glencar woods, Dromahaire.
- H. nitida**, Müll.—Along a stream-side at Rosses Point; Lough Gill shores at Tobernault; common with *Succinea elegans* on Watercress in a marsh near Carrowmore.
- Arion ater**, L.—The previous dry season may possibly have accounted for the scarcity of this species. At altitudes above about 1,000 feet, the jet-black form only was noticed, and these were the only adult specimens found. A few partly grown, at Rockwood and Rosses Point, of the brown and lead-coloured forms. In 1900 also at Inishmurry, Ballysadare, and Drumcliff.
- A. subfuscus**, Drap.—A few only at Lissadill, Sligh wood (Rockwood), in the cave mouth at Gleniff (altitude about 1,400 feet) and slopes below, and east end of the Swiss Valley. The only adult specimen noticed was among those found at the cave.
- A. hortensis**, Fér.—Sparingly in each locality visited, mostly young specimens; moderately common in September, 1900.
- A. circumscriptus**, Johnst.—Decidedly rare; Lissadill Glen, below Doonee Rock, Glencar near fall. Ballysadare and Dromahaire Abbey, 1900.

- Limax maxlmus**, L.—Not a trace of this species anywhere during the week's visit. During our 1900 visit the var. *Ferussaci* was found at Glencar.
- L. marginatus**, Müll.—A few in Knocknarea Glen, and in the Glencar woods near the fall. This was about the only species that the heavy shower brought out on the crawl at Rockwood. We got some then in the Slish woods.
- Agriolimax agrestis**, L.—Common in most damp places; larger in Glencar and at the cave in Gleniff than elsewhere; Dromahaire Abbey, Ballysadare old church, and var. *nigra* on Inishmurry, 1900.
- A. lævis**, Müll.—As usual not common; along stream sides, Rosses Point; Raghly; Lissadill Glen; lake shores of Lough Gill at Rockwood and Glencar Lake; Dromahaire, 1900. Where *Hyalinia nitida* occurs, this species will usually be found not far off, and both are sometimes associated with *Vertigo antivertigo* and a small, deep-red form of *Succinea elegans* in the marshes of north-east Ireland. At Rosses Point it was with the first named.
- Amalia Sowerbyi**, Fér.—One or two only in Slish Wood, but in 1900 we found a number inside the cashel on Inishmurry.
- Helix pygmæa**, Drap.—Very rare at Rockwood, a few in the Strand-hill shell pockets, one in Glencar. In moss at Glencar (Co. Sligo), 1900.
- H. rotundata**, Müll.—At all the localities visited, but not so common as on Inishmurry and in the district south of Sligo in 1900.
- H. rupestris**, Drap.—Generally distributed on the limestone; abundant on some dry stone dykes at Rosses Point, Raghly, Carrowmore, Lissadill, Glencar, and Swiss Valley. On cliffs at the cave at Gleniff; in profusion at Dromahaire Abbey, living with *Balea perversa* among the flat stones on summit of dyke, 1900.
- H. pulchella**, Müll.—A few under stones at Rosses Point, and in abundance dead in shell-pockets at Strandhill; var. *costata* on shore at Glen Lodge, Knocknarea, and some nice specimens with the type, in an exceedingly dry situation under stones on the short turf along the strand at Raghly. Only inland locality, Glencar, 1900. We have never taken the variety except in a very dry situation, though the type may be found also on lake shores and in marshes, locally, all over the central plain. L. E. Adams states (*Manual*, 1896, p. 57) that in Scotland it is more plentiful on the east coast than on the west. In Ireland the reverse holds good.
- H. aculeata**, Müll.—A few in moss, Lissadill Glen; near Doonee Rock; in shell-pockets, Strandhill; with var. *albida*, Glencar woods, Glencar (Sligo), 1900.
- H. lamellata**, Jeff.—Very local, only in old native woods as usual. Adams states (*op. cit.*) that "It is one of those few species of which no one has been ingenious enough to find varieties." Among mossy stones and dead leaves, under Doonee Rock we found a few colourless specimens with the typical form. A few near Glencar fall, 1900.

- Hellix hispida**, L.—Not very common : Rockwood, Lissadill, Raghly, Glencar; var. *alba*, Glencar; var. *concinna*, a dark red form, common on grassy ledges under the cliffs at the cave, Gleniff; a few in Glencar. It is curious that in Antrim and Down this form is the one most abundant at or near the sea level, especially on short sandy turf; the hispid form higher up or more inland. It was in myriads—a form with small umbilicus—in valleys in the dunes at Strandhill.
- H. rufescens**, Penn.—More or less common at almost all localities. Lissadill, Rockwood, Carrowmore, Knocknarea Glen, Strandhill, Glencar, at fall; Dromahaire, 1900.
- H. fusca**, Mont.—On *Luzula*, right under the spray of the waterfall at Glencar; rare in moss in Slish wood and below Doonee Rock.
- H. arbustorum**, L.—This northern species has long been known to live in Glencar about the falls. We found only immature dead specimens at the lower fall after a keen search. Yet they were fairly common there, partly grown (Chaster and Collier), September, 1900. They seem to prefer a high altitude in the Sligo district, as A. W. Stelfox found them swarming much higher up the ravine, close to the cliffs, in July, 1901. We found them in profusion, both young and old, on damp vegetation in both mouths of the great cave in Gleniff, especially among Golden Saxifrage in the smaller mouth. Here they live in deep shade; the habitat, a narrow rift, faces north-east, and as the altitude is about 1,400 feet, they get the full benefit of the mountain mists and frequent "cloud-caps." These alpine specimens, both type and vars. *cincta*, *flavescens*, and *fusca*, are quite as large as the finest from Murlough Bay, Co. Antrim, which live in sheltered damp woods, almost at sea level. In England the northern forms of this species are usually smaller than the southern (Adams, *op. cit.*), but our Irish specimens are quite as large and fine as any Dover specimens we have seen. At the cave they are associated with alpine plants, such as *Arenaria ciliata*, *Saxifraga aizoides*, *Sedum Rhodiola*, *Draba incana*, *Asplenium viride*.
- H. acuta**, Müll.—This seems to be the only xerophile on the coast near Sligo, though Miss Warren (*loc. cit.*) records *H. ericetorum* and *H. intersecta* from localities not much further west. We found it on Knocklane dunes near Raghly, and the var. *strigata* on Strandhill dunes, and at Cliffony, 1900.
- H. nemoralis**, L.—We did not find this as freely as on our previous visit, 1900, except on the sandhills. As on the West Donegal dunes, a good many white-lipped specimens were noticed, mainly of the pale yellow form with translucent bands so common at Bundoran. These were at Knocklane dunes. In myriads dead, and abundant alive, and some calcreted as mentioned, at Strandhill, where A. W. Stelfox found a nice scalariform specimen; a few at Rosses Point and Rockwood. At Annacoona, on the summit of the



NAT. SIZE.

R. Welch, Photo.

HELIX ASPERSA WITH REVERSED FORM OF SHELL.

From dunes near Ardtermon Castle, Raghly.



NAT. SIZE.

R. Welch, Photo.

RECENT SANDSTONE, STRANDHILL DUNES.

Calcrete of shell-sand forming a sandstone, with contained landshells,

A, upper surface, B, under surface of a thin bed.

mountain above Gleniff, altitude 1,700 feet, Stelfox and Gunn found a colony of large heavy shells, var. *rubella*, with white lip, and var. *roseolabiata*; unfortunately, they were much weathered—some had hardly any epidermis remaining. Some of these measure 24×19 and 23×20 mm. They were also fairly common and large in the cave mouths, Gleniff. All over the dry stone walls of the beehive cells, sweat-house, and cashel, Inishmurry, æstivating in the crevices, we found a large race of this species in 1900, more like the Valencia Island shells than the still larger Aran form.

H. aspersa, Müll.—Not common anywhere except about Doonfore, Knocklane, and one little stone heap on margin of the sandhills near the old castle, Raghly. We have never found before in any part of Ireland so much variety in colour, markings, size, and shape, as occurs on this limited area; almost all the texture, shape and colour varieties (so called) were there with connecting forms also. A dozen dead shells broken in a mouse run, Strandhill; a few at Rosses Point, rare at Rockwood and Glencar. At latter place Mrs. Praeger found a very beautiful large specimen of the var. *undulata*, Moq. In the cashel on Inishmurry, and at Dromahaire, 1900.

SINISTRAL FORM.—While the forms living with *H. nemoralis* at the Knocklane end of the dunes were mainly light banded, at the Raghly end A. W. Stelfox found a little stone heap about ten yards long, where dark bandless forms, exceedingly rare in Ireland, were plentiful; some were almost black, but most had unfortunately lost the greater part of the epidermis. Some were unicolorous, (*nigrescens* Moq. ?) others with a little banding or narrow undulatory markings, and some very thin. While we were examining these he was fortunate enough to find a fine dark reversed specimen alive. It was about three quarters grown, and is the first we have any knowledge of in Ireland. A few have been recorded (*Journ. of Conch.*) from various parts of England. Needless to say it is, like Mr. Standen's specimen (*Journ. of Conch.*, vi., p. 176) being pampered, and is making shell fast. It does not seem to be as active as dextral specimens we have kept alive for over nine years past, and likes to shelter under the lettuce it is fed on during the day. Mr. Standen, whom we missed very much at this Conference, gives (*loc. cit.*, vii., pp. 33-38) a most interesting account of the reproduction of lost love-darts in his sinistral and a dextral specimen. Should we succeed in rearing it to maturity it will be carefully dissected to see if the organs differ in position, &c., from those of dextral specimens. (See Plate 9).

Buliminus obscurus, Müll.—This species seems to have mainly an eastern and northern range in Ireland (see Scharff, *J.N.* 1892, p. 109). It is common but very local near Larne and Belfast. We found it near Athlone on our way home from the Galway Conference, 1895. A keen search in many likely habitats in woods and at base of cliffs gave no results about Sligo, and we were much surprised to find 14 dead specimens all close together (a dinner plate would have

covered most of them as they lay) in an unlikely one, an earthy layer at lowest level of the S.W. slope of the big dune at Strandhill. They were associated with *Helix pulchella*, *H. hispida*, *Cochlicopa lubrica*, and *Clausilia bidentata*. The latter is common in Irish shell-pockets, but we have never found *Buliminus* on or near a sandhill area. It was not in any of the "pockets" sieved for Vertigos, &c., and the nearest suitable habitat, Knocknarea cliff talus, is a full mile away. Mr. Grierson, (*I.N.*, 1901, p. 111) records it from Ballysadare and Lough Gill.

Cochlicopa lubrica, Müll.—Common in each locality worked. The small red sandhill form (*fusca*, Moq.?) at Raghly and Strandhill dunes, and Inishmurry.

Pupa anglica, Fér.—Common but local on mossy banks, or in damp parts of the woods with *Acme* and *H. pura*, usually in the moss *Hypnum splendens*; Rosses Point; Lissadill Glen among Liverworts; Glencar (Sligo) and Swiss Valley; var. *pallida* with type near Tobernault; var. *alba* and var. *pallida* with type near Doonee Rock.

P. cylindracea, Da Costa.—Common in all suitable habitats in both counties, right up to the cave in Gleniff; Inishmurry. Some very short forms occurred on dry walls.

P. muscorum, Müll.—Local at Raghly Strand under small flat stones on the very short grassy turf; in profusion in the "pocket" material sieved out at Strandhill big dune.

Vertigo edentula, Drap.—Rare everywhere, a great contrast to the large quantities we took in sweep nets and otherwise during the Kerry week, 1898¹. Even in the most likely places this gave no results about Sligo. In moss at Lissadill, Hazelwood at Tobernault, Rockwood, Glencar woods and Swiss Valley. Near Ballycastle, Co. Antrim, it is as common in sweepings almost as in Kerry.

V. pygmæa, Drap.—A few in most likely places; Rosses Point, Raghly, Doonfore, and Knocklane; common in the Strandhill "pockets"; Ballysadare old church, Swiss Valley.

V. substriata, Jeff.—Very rare in moss, Swiss Valley; Glencar (Sligo), one of these had only one tooth on the body; one or two only in the Strandhill sievings.

V. antivertigo, Drap.—Very rare; Rosses Point; Glencar, 1900.

V. angustior, Jeff.—Plentiful in the "pockets," Strandhill, dead as usual, with one pure white specimen. It is extremely abundant in the west Donegal, north Derry, and north Antrim dune pockets, yet we have never found the actual living-ground anywhere. Miss Warren has done so a little further west. So local and rare was this species in Jeffreys' time that he only gives four localities in England and Wales (*BritConch.*, vol. 1.) The Conch. Soc. Census, 1902, notes

¹ See *I.N.*, vol. vii., p. 223.

it from only five counties in England, four of which are inland, one in Scotland, and seven in Ireland, the last all maritime, but the county in which it is most plentiful—Donegal—is not given in the Census. We have never taken it away from coast sandhills, and all records so far prove it to be in Ireland a strictly maritime species.

Balea perversa, L.—Local and not abundant; Lissadill Glen, on an old willow between Hazelwood and Rockwood, Church Island, Glencar woods, and Swiss Valley. Swarming on top of a wall at Dromahaire Abbey.

Clausilia bidentata, Ström.—Fairly common all over the district especially in old graveyards.

Succinea putris, L.—Rosses Point, Lissadill, Rockwood, Glencar (Sligo), Glencar at fall, none full-grown.

S. elegans, Risso.—Rosses Point, Raghly, Rockwood, Carrowmore; lake shores, Glencar. These were mainly a small deep red form with dark or very dark animal. We do not believe any authority could definitely separate this species from the preceding in some Irish localities; the two grade into each other so often.

Carychium minimum, Müll.—Common in most damp places; some in the shell-pockets also.

Limnæa stagnalis, L.—A few dead on lake shores and alive in pond, Rockwood; on shore of Church Island.

Limnæa peregra, Müll.—Common in each locality except Strandhill and Knocknarea Glen. A small form in stream crossing road high up in Gleniff. Var. *lacustris* and var. *acuminata* with other forms at Rockwood.

L. palustris, Müll.—Rosses Point, Rockwood and Church Island, Glencar Lake, Bonnet River at Dromahaire.

L. truncatula, Müll.—Common on mud of very shallow dried up pools in dunes at Raghly; a few at Lissadill and Doonfore; Lough Gill; pool near Sligo; Glencar (Sligo).

Physa fontinalis, L.—Common in lakelets at Rosses Point; in drains at old castle, Raghly; Glencar Lake (both counties). Var. *albina* occurred with the type on the leaves of the Yellow Water-lily, near Doonee Rock.

[**Planorbis corneus**, L.—See *J. N.*, x., 1901, p. 131. We were unable to visit the pond.]

P. vortex, L.—Swarming on water plants in Lough Gill, none full grown, but many adult dead on shore; Glencar Lake (Sligo). This species, unlike the next, seems to prefer permanent waters of lakes and slow rivers. It has its main habitats in the lakes along the N.W. margin of the limestone plain.

P. spirorbis, L.—One dead specimen only in flood debris, lake shore near Tobernault; Miss Warren reports it (*loc. cit.*) very common in old bog drains further west in the county.

- Planorbis contortus**, L.—Lakelets on Rosses Point; Lough Gill; Glencar (Sligo); River at Union Wood, Collooney; Glencar Lake dredgings.
- P. albus**, Müll.—In lakelet, Rosses Point; very common dead on shores, Lough Gill; alive on Yellow Water-lily leaves in pools near Doonee Rock; pond, Carrowmore; river at Collooney; Glencar Lake (Sligo).
- P. crista**, L.—Lough Gill, rare. One very large distorted specimen is twice the size of any Irish specimen we have ever seen; it measures 3×2 mm., the final whorls crossing the first at an angle of about 45° , and detached in places. Owing to its size, this shell puzzled us very much. Not common in lakelet, Rosses Point; Cliffony, 1900; in myriads in a small pond near Kilmacowen old church, with vars. *nautilus* and *lævigata*, 1900. These specimens are beautiful objects under the microscope, as they are covered with masses of diatoms, several species being represented. (See p. 214.)
- P. fontanus**, Lightf.—Moderately common on underside of leaves of Water-lily (*N. luteum*) in pools on shore at Doonee Rock; Glencar (Sligo ?) 1900. We took it also in the Bundrowse river, which separates Leitrim and Donegal, in 1899. A very local species in Ireland, and rarely plentiful.
- Ancylus fluviatilis**, Müll.—Large and variable as to shape on margins of Lough Gill; many also dead in shell debris on shores of Glencar Lake (Sligo).
- A. lacustris**, L.—Partly grown specimens under Water-lily leaves in little pools on shore near Doonee Rock.
- Acme ilneata**, Drap.—Var. *alba* in moss and liverworts on side of path in the glen, Lissadill, very large and fine; both type and var. in wood below Doonee Rock; type and var. common in moss, Glencar (Sligo); nice specimen of both in the moss *Hypnum splendens* on the talus slopes in the Swiss Valley. A few sieved out of the shell-pockets, Strandhill. Though this species is not rare locally in S.W. Kerry, it is more abundant in the north. We know nine stations for it in Antrim alone, one well within the city boundary, Belfast.
- Bythinia tentaculata**, L.—Common; Rosses Point, Lough Gill, river at Collooney, Glencar Lake.
- Hydrobia ulvæ**, Penn.—A few in the shell-pockets.
- Valvata piscinalis**, Müll.—Lissadill, common in Lough Gill and river near Collooney, dredged in myriads in *Chara* with *Bythinia* and a few of the next in Glencar Lake.
- V. cristata**, Müll.—Common in river at Union Wood, Collooney; Rosses Point; a few only in the Glencar Lake dredgings.
- Neritina fluviatilis**, L.—Common in Lough Gill; in Glencar Lake (both counties). This is the most northerly habitat yet known for this species in Ireland, where its distribution is mainly westerly.
- Sphærium corneum**, L.—Lough Gill, common but not large; river near Collooney; pond at Belladrihid; Glencar Lake dredgings; very large obese form in lakelet at Rosses Point, where it was common in submerged moss on margin, in an inch or two of water only.

Pisidium fontinale, C. Pfr.—Rosses Point, in a drain at Doonfore, Lissadill, Rockwood, Drumcliff bridge, Gleniff, Collooney, Glencar (Sligo), Dromahaire.

P. millum, Held.—Rosses Point, in drains Raghly and Doonfore, river at Drumcliff Bridge, Dromahaire.

P. obtusale, C. Pfr.—Rosses Point; Drumcliff Bridge; river at Union Wood, Collooney.

P. pusillum, Gmel.—Rosses Point, Raghly, Doonfore, Drumcliff, bog at head of Gleniff; Collooney and Bundrowse river, 1900.

Anodonta cygnea, L.—Many dead specimens of a small thin form on shore at Rockwood. In 1900 we found it living in abundance in two or three feet of sandy mud in the little bay in Church Island. They are very different to the large *Anodons* of Glaslough (Monaghan), or Moira Canal (Down).

We have to thank Messrs. Chaster, Jackson, and Nelson for assistance on various little points that arose in identifying non-typical specimens. Also Mr. Charles Oldham, who, as usual, named the *Pisidia*. By a comparison with the last issue of the Conchological Society's Census, 1902, it will be seen that this list includes 23 new Sligo and 37 new Leitrim records.

Belfast.

MARINE MOLLUSCA.

BY G. W. CHASTER, M.R.C.S.

The following species are represented in a small collection of marine shells made by Mr. Welch and others at Raghly:—

<i>Anomia ephippium</i> .	<i>Littorina rudis</i> .
<i>Mytilus edulis</i> .	<i>Rissoa parva</i>
<i>Montacuta bidentata</i> .	and var. <i>interrupta</i> .
<i>Tellomya ferruginosa</i> .	<i>Manzonina costata</i> .
<i>Kellia suborbicularis</i> .	<i>Onoba striata</i> .
<i>Lasæa rubra</i> .	<i>Skenea planorbis</i> .
<i>Tellina fabula</i> .	<i>Capulus hungaricus</i> .
<i>Donax vittatus</i> .	<i>Lamellaria perspicua</i> .
<i>Saxicava rugosa</i> .	<i>Bittium reticulatum</i> .
<i>Thracia fragilis</i> .	<i>Cioniscus albidus</i> .
<i>Patina pellucida</i> .	<i>Ondina divisa</i> .
<i>Gibbula tumida</i> .	<i>Buccinum undatum</i> .
<i>Delphinoidea nitens</i> .	<i>Purpura lapillus</i> .
<i>Phasianella pullus</i> .	<i>Tornatina truncatula</i> .
<i>Lacuna divaricata</i> .	<i>Diaphana hyalina</i> .
<i>L. pallidula</i> .	<i>Bullinella cylindracea</i> .
<i>Littorina obtusata</i> .	<i>Philine punctata</i> .

Southport.

INSECTA.

COLEOPTERA.

BY J. N. HALBERT.

[Collected for the R.I.A. Flora and Fauna Committee.]

With the exception of the Butterflies and Moths, less is known of the zoology of Sligo than of most of our western counties. Very little collecting has been carried on there, and that chiefly of a desultory character. As regards the Coleoptera, the most important paper is one published by the Rev. W. F. Johnson, in the *Irish Naturalist* for 1902, giving the results of a holiday spent in the vicinity of Enniscrone, on the shores of Killala Bay. Many records of uncommon insects are given in this paper, such as *Bledius erraticus*, *Bembidium minimum*, &c. Other entomologists who have visited the district are W. E. Sharp and Dr. G. W. Chaster. On the occasion of the visit of the Dublin Naturalists' Field Club in 1902, a few insects were collected, notably the mountain ground-beetle *Carabus glabratus* on Ben Bulbin. All of these records were made use of in the general list of Irish beetles published two years ago.

The present contribution to the beetle fauna of the Sligo district, numbering about one hundred and forty species, necessarily includes many new county records, as well as a few for the province of Connaught. The Coleoptera were decidedly scarce during our visit in July, in part due to the time of the year, which is a little late for many species usually to be met with during the early summer. We succeeded, however, in finding a few notable insects, especially the arctic ground-beetle *Pelophila borealis* on the shores of Lough Gill. Indeed I cannot remember having seen this interesting species so common in any other locality. The local *Bryaxis Helferi* occurred on the shores of Ballysadare Bay, the third recorded locality for this southern insect. *Donacia crassipes* at Lough Gill is also an addition to the fauna of Connaught; and the Holly-boring Weevil, *Rhopalomesites Tardyi*, was not uncommon near Rockwood, living under decaying fir bark, a rather unusual habitat for the species.

In the following list localities have been omitted for the very common insects, as they occurred in most of the places visited. The nomenclature is that of Sharp and Fowler's list (1893).

CARABIDÆ.—*Cychrus rostratus*, Glencar. *Carabus granulatus*. *Notiophilus biguttatus*. *N. aquaticus*, Raghly. *Leistus rufescens*, not usually found on mountains, was taken on the summit of Annacoonia by Prof. Carpenter. *Nebria brevicollis*. *Pelophila borealis*, quite common under stones on the south shore of Lough Gill near Rockwood, and on the banks of a partially drained lake near Ballysadare. *Elaphrus riparius*. *E. cupreus*, Lough Gill, Raghly. *Loricera pilicornis*. *Clivina fossor*. *Dyschirius globosus*. *Brosicus cephalotes*, sand-hills at Raghly. *Badister bipustulatus*. *Chlenius vestitus* and *C. nigricornis*, both species occurred on the shores of Lough

Gill. *Harpalus ruficornis*. *Dichirotrichus pubescens*, Strandhill. *Anisodactylus binotatus*, var. *spurcaticornis*, Deg., under stones on the marshy edge of a lake at Ballysadare. *Pterostichus versicolor*. *P. madidus*. *P. niger*. *P. vulgaris*. *P. strenuus*. *P. vernalis*, Ballysadare. *Amara fulva*, sands at Rosses Point, a form with a strong greenish reflection on the elytra. *A. apricaria*, Raghly. *A. spinipes*, Strandhill. *A. communis*. *Calathus cisteloïdes*, coast. *C. mollis*. *C. melanocephalus*. *Anchomenus albipes*. *A. marginatus*, L. Gill. *A. piceus*, Ballysadare. *Olistopus rotundatus*, hills. *Bembidium littorale*. *Trechus obtusus*. *Dromius linearis*, L. Gill.

HALIPLIDÆ.—*Haliplus flavicollis*, Ballysadare River. *H. fulvus*, Glencar. *H. fluviatilis*.

DYTISCIDÆ.—*Celambus inæqualis*. *Deronectes depressus*, Ballysadare. *Hydroporus palustris*. *Agabus guttatus*, stream flowing into Glencar Lake. *Ilybius fuliginosus*.

GYRINIDÆ.—*Gyrinus natator*. *Orectochilus villosus*, Glencar.

HYDROPHILIDÆ.—*Chaetarthria seminulum*, lake shores. *Helophorus aquaticus*, Strandhill. *H. brevipalpis*. *Megasternum boletophagum*.

STAPHYLINIDÆ.—*Aleochara morion*, Ballysadare. *Oxyropa* sp. *Calodera æthiops*, a few specimens occurred by sweeping in marshy places near Ballysadare, a new record for Connaught. *Homalota gregaria*, lake shores. *H. analis*. *H. jungi*. *Autalia impressa*, Ballysadare. *Oligota punctulata*, Ballysadare, a new record for Connaught. *Tachyporus* sp. *Tachinus rufipes*. *T. marginellus*, Rosses Point. *Megacronus analis*, Raghly. *Quedius molochinus*, coast. *Quedius semicæneus*. *Ocypus ater*. *O. cupreus*. *Philonthus varius*. *P. fimetarius*. *Xantholinus glabratus*, Raghly. *Lathrobium quadratum*, Lough Gill. *Stenus guttula*, Glencar. *S. junco*. *S. buphthalmus*. *S. fuscipes*, Ballysadare. *S. impressus*. *S. picipes*. *Oxytelus rugosus*. *O. laqueatus*. *Trogophilus corticinus*.

PSELAPHIDÆ.—*Bryaxis Helferi*, under stones on the shore at Strandhill, a new record for the province of Connaught.

SILPHIDÆ.—*Anisotoma dubia*, Raghly. *A. calcarata*, Rosses Point. *Silpha subrotundata*.

HISTERIDÆ.—*Onthophilus striatus*, Ballysadare.

COCCINELLIDÆ.—*Coccinella x-punctata*. *C. xi-punctata*, abundant on the sandhills at Raghly, Strandhill, and Rosses Point; in all localities the variety *brevifasciata*, Weise, usually outnumbered the type.

NITIDULIDÆ.—*Cercus pedicularius*, Ballysadare. *Epuræa æstiva*. *Meligethes æneus*.

LATHRIDIIDÆ.—*Coninomis nodifer*. *Enicmus minutus*.

CRYPTOPHAGIDÆ.—*Cryptophagus dentatus*. *Atomaria* sp.

SCARABÆIDÆ.—*Geotrupes sylvaticus*. *Aegialia arenaria*, Strandhill. *Serica brunnea*, Raghly and Strandhill.

ELATERIDÆ.—*Agriotes obscurus*.

DASCILLIDÆ.—*Dascillus cervinus*, Strandhill. *Microcara livida*, var. *Bohemani*, Ballysadare. *Scirtes hemisphaericus*, Ballysadare.

MALACODERMIDÆ.—*Telephorus flavilabris*. *T. thoracicus*, Ballysadare. *Rhagonycha fulva*. *R. limbata*, Strandhill. *R. elongata*, Glencar. *Malithodes marginatus*.

CERAMBYCIDÆ.—*Grammoptera ruficornis*, Lough Gill.

CHRYSOMELIDÆ.—*Donacia crassipes*, common on leaves of Water-lilies in shallow pools on the shore of Lough Gill; not previously recorded from Connaught. *D. versicolore*, in same locality as preceding. *D. comari*, common. *Chrysomela Banksi*, Rosses Point. *Gastroidea viridula*. *Phyllodecta vitelline*, Strandhill. *Hydrothassa marginella*. *Prasocuris phellandrii*, Ballysadare. *Longitarsus jacobæ*. *L.* sp. either *lævis* or *pellucidus*, Raghly, Strandhill, &c. *Aphthona nonstriata*. *Phyllotreta exclamationis*, Glencar. *Sphæroderma testaceum*. *Crepidodera transversa*. *C. ferruginea*. *Psylliodes affinis*, Raghly.

MORDELLIDÆ.—*Anaspis ruficollis*. *A. melanura*.

CURCULONIDÆ.—*Apion ervi*. *Otiorrhynchus picipes*. *Phyllobius oblongus*. *P. argentatus*. *Philopodon geminatus*, Raghly. *Sitones tibialis*. *Orchestes fagi*. *O. salicis*, Strandhill, on *Salix repens* on sandhills. *Grypidius equiseti*, Ballysadare. *Caliodes iv.-maculatus*. *Ceuthorrhynchus erysimi*, Lissadill. *C. contractus*. *Phytobius canaliculatus*, Ballysadare. *Linnobaris T-album*. *Rhopalomesites Tardyi*, found under bark of decayed fir trees at Rockwood.

HEMIPTERA.

BY J. N. HALBERT.

(Collected for the R.I.A. Flora and Fauna Committee).

Though less numerous in species than certain other groups, the plant- and water-bugs were by far the most abundant insects during the Sligo Excursion; some of the commoner kinds swarmed on their various food plants in the woods. In all about fifty species of Heteroptera were collected. The great majority of these are common and widely distributed species, though a few may be considered local or rare. The shield-bug *Podisus luridus*, taken at Lough Gill, is a local insect of western range in Ireland. In the lake itself specimens of the water-bug *Corixa Germari*, Fieb., hitherto unrecorded as Irish, were secured. Another species of the same genus *C. Bonsdorffi*, Sahlb, is abundant in the lakes near Rosses Point. This used to be considered a rare insect, but it has lately been found in numerous localities throughout the country. About forty species of Homoptera, or Frog-hoppers, were collected, but the majority of these have yet to be identified.

PENTATOMIDÆ.—*Tropicoris rufipes*, common in woods. *Podisus luridus*, a specimen of this local species occurred amongst debris on the shore of Lough Gill.

LYGÆIDÆ.—*Scolopostethus neglectus*, Strandhill.

TINGIDIDÆ.—*Monanthia cardui*, common.

HYDROMETRIDÆ.—*Microvelia pygmaea*, Lough Gill, in pools on shore. *Velia currens*, common. *Gerris lacustris*, common.

REDIVIDÆ.—*Nabis flavomarginatus*, undeveloped form abundant.

SALDIDÆ.—*Salda scotica*, common on lake shores, Lough Gill, Glencar, Raghly. *S. littoralis*, Lough Gill.

CIMICIDÆ.—*Anthocoris nemoralis* and *A. sylvestris*, common.

CAPSIDÆ.—*Pithanus Maerkeli*, common. *Miris calcaratus*, Glencar. *Teratocoris Saundersi*, not uncommon in marshy places near Ballysadare. *Leptopterna ferrugata*, very common. *Monalocoris filicis*, Knocknarea. *Bryocoris pteridis*, on ferns, Glencar. *Calocoris vi.-guttatus*, found commonly in most localities. *C. bipunctatus*, common. *C. roseomaculatus*, Rosses Point and Knocknarea. *Plesiocoris rugicollis*, Lough Gill, on willows. *Lygus pratensis*, common. *L. contaminatus*, L. Gill and Lissadill. *L. pabulinus*, Lissadill. *L. pastinace*, Glencar. *Rhopalotomus ater*, common. *Globiceps dispar*, Ballysadare and Strandhill. *Meconema ambulans*, common. *Orthotylus marginalis*, Lough Gill. *Phylus melanocephalus*, Lough Gill, on Oaks. *P. coryli*, Glencar, black and brown forms common in Hazel. *Psallus ambiguus*, *P. variabilis*, *P. varians*, the last three species are common in the woods about Lough Gill. *Plagiognathus viridulus*. *P. arbustorum*, common.

NOTONECTIDÆ.—*Notonecta glauca*, Lough Gill.

CORIXIDÆ.—*Corixa atomaria*, lake at Rosses Point. *C. Linnæi*, *C. semistriata*, *C. Fallenii*, last three common in the Ballysadare River. *C. striata*, common. *C. distincta*, Rosses Point. *C. fossarum*, Ballysadare and lakes at Rosses Point. *C. Germari*, in pools on the shore of Lough Gill. *C. Bonsdorffi*, common in the lakes at Rosses Point. *Sigara minutissima*, Lough Gill.

Dublin.

APTERA.

BY PROF. GEO. H. CARPENTER, B.SC., M.R.I.A.

Our investigation of the Springtails and Bristletails of the Sligo district was rewarded by the discovery of ten species of the former group, and one of the latter. So little is yet known of the distribution of these tiny insects in Ireland that records of even the commonest species are valuable. But it is gratifying to find that one of the Springtails taken on the shores of Lough Gill has not hitherto been noticed in the British Islands. This species, *Xenylla brevicauda*, Tullberg, has a distinctly northern continental range, and falls naturally, therefore, into a faunistic group most characteristic of the neighbourhood of Sligo.

The following are the species obtained :—

Machilis polypoda, Linn.—Strandhill, Carrowmore, Lough Gill.

Sminthurus viridis, Linn.—Ballysadare.

S. luteus, Lubb.—Strandhill.

Orchesella cincta, Linn.—Lough Gill shore.

Tomocerus tridentiferus, Tullb.—Lough Gill shore.

Lepidocyrtus lanuginosus, Gmel.—Lough Gill shore.

Entomobrya multifasciata, Tullb.—Glencar.

E. muscorum, Nic.—Strandhill.

Isotoma palustris, Müll.—Glencar.

I. arborea, Linn. (*I. denticulata*, Schöff.)—This species occurred rather commonly under stones on the shore of Lough Gill, near Doonee Rock. This habitat is noteworthy, as the insect is usually found under the bark of trees and shrubs.

Xenylla brevicauda, Tullb.¹—Under stones on Lough Gill shore, a single specimen. This species—an addition to the fauna of the British Isles—is readily distinguished from *X. maritima*, Tullb., and *X. humicola*, O. Fab., by the excessive reduction of the spring (Plate 10, A, figs. 1, 4) whence the specific name is derived. As in other members of the genus, there are five ocelli (fig. 2) on either side of the head, but no post-antennal organ; while each foot has only one claw and two tenent hairs (fig. 3). The position of the spring (fig. 4) enables me to figure one of the mucrones in profile, and the other as seen from beneath, the form agreeing nearly, though not exactly, with figures of the same species given by Agren² and Börner. Doubtless, however, there is considerable variation in these details. *X. brevicauda* has been found in Norway, Sweden, Finland, Russia, and Northern Germany.

EXPLANATION OF PLATE 10, A. (p. 201).

- Fig. 1. *Xenylla brevicauda*, Tullb., ventral view, magnified 63 times.
 2. Left antenna and ocelli, magnified 216 times.
 3. Foot and claw, magnified 290 times.
 4. Spring, magnified 290 times.

ARACHNIDA.

ARANEIDA AND PHALANGIDA.

BY PROF. GEO. H. CARPENTER, B.SC., M.R.I.A.

The spiders collected or noted were few in number, and of no great rarity. A list of the species, with localities, may, however, be worthy of record:—

Tetrrix denticulata, Oliv.—Sliswood, Lough Gill.

Pedanostethus lividus, Bl.—Lough Gill shore; adult female.

Erigone dentipalpis, Wid.—Glencar; Strandhill; both sexes adult.

¹ T. Tullberg, Sveriges Podurider. *Kongl. Svensk. Vetensk. Akad. Handl.* vol. x., No. 10, 1872 (p. 53, pl. xi., figs. 9-14).

² H. Agren, Zur Kenntniss der Apterygoten-Fauna Süd-Schwedens, *Stett. Entom. Zeitung*, 1903, p. 126, pl. ii., fig. 9.

³ C. Börner, Neue Collembolenformen, *Zool. Anz.* xxiv., 1901, p. 697, fig. 2.

Stylothorax retusus, Westr.—Lough Gill; Glencar; both sexes adult.

Linyphia peltata, Wid.—Lough Gill shore, adult female.

L. triangularis, Cl.—Common everywhere.

Pachygnatha Degeerii, Cl.—Glencar.

Meta segmentata, Cl.—Common everywhere.

M. merianæ, Scop.—Lough Gill shore, snares numerous under drains, &c.

Lycosa ruricola, De Geer.—Lough Gill shore; adult female.

Pardosa amentata, Cl.—Glencar; female with egg-covers.

Pirata piraticus, Cl.—Lough Gill and Glencar Lake; females with egg-bags.

The Harvestmen are relatively of greater interest, one of the species being decidedly a rarity:—

Phalangium opilio, Linn.—Lough Gill shore.

P. saxatile, Koch.—Strandhill near the shore. This species has hitherto been found in Ireland only at Rush, Co. Dublin.

Mitopus morio, Fab.—Common everywhere.

Acantholophus tridens, Koch.—Lough Gill shore.

Nemastoma lugubre, Fab.—Lough Gill shore.

Dublin.

ACARINIDA.

HYDRACHNIDÆ.

BY J. N. HALBERT.

[Collected for the R.I.A. Flora and Fauna Committee.]

Collections of Water-mites were made in the lakes near Rosses Point, Lough Gill, Glencar Lake, and in streams near Ballysadare, resulting in the capture of about twenty species. Some of the localities tried, especially the lakes, were not favourable for these creatures, as certain water plants amongst which they are usually to be found were scarce or altogether absent. A few of the species have not yet been satisfactorily identified, especially in the genera *Eylais*, *Lebertia* and *Sperchon*.

The most interesting water-mite found is undoubtedly *Arrhenurus Mabii*, now recorded for the first time from the British Isles. It was originally discovered a few years ago by Dr. Piersig in a lake in the Black Forest, and since that time it does not seem to have been recorded from any other locality. *Hydrachna distincta* is also an addition to the British records, and a new form of *Eylais* was discovered in Lough Gill.

Considering the smallness of the collections the results are satisfactory, and no doubt careful dredging in the lakes would bring to light many additional species.

Eylals bicornuta, n. sp.

In the sculpture of its eye-plate (Plate 10, B, fig. 1.), this form is allied to *E. gigas*, Piersig¹ compared with which species the eye-plate is narrower, measuring .47 mm. across; the length of a single capsule is about .27 mm. The two processes on the front margin are much longer and bluntly pointed, separated by a wide deep indentation. These processes arise from the actual front rim of the eye-plate and are not inclosed by an anterior chitinous part as they are in *E. gigas*. The bridge connecting the eye-plates is very long and highly chitinised; a muscle attachment, roughly circular in shape, projects in a rounded prominence at the middle of the posterior margin; the hinder emargination is about $\frac{1}{3}$ the length of the eye-plate.

The palps closely resemble those of *E. infundibulifera*, Koen., in shape measuring about 1.42 mm. in length. Inner corner of the third segment moderately developed, with numerous rather long stout spines, some of which are feathered. On the lower inner surface of the fourth segment there is a row of eight or nine long spines, and another of about seven in a corresponding position on the outer side. The capitulum (fig. 2) is about 1 mm. in its entire length from the spine-like process on the mandible to the apex of the pharynx, length of the mandible about .46 mm. The pharynx reaches well beyond the lateral processes of the maxillary plate. Front processes ("Vorderer maxillarfortsatz" of Piersig) distinctly angled near the middle of the lower margin.

Locality, Lough Gill.

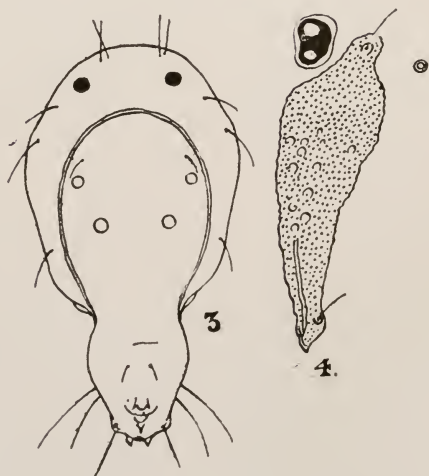
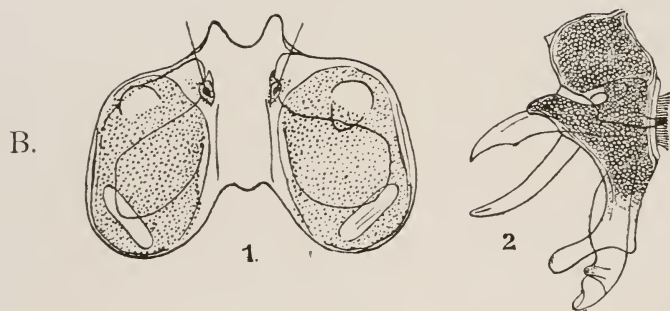
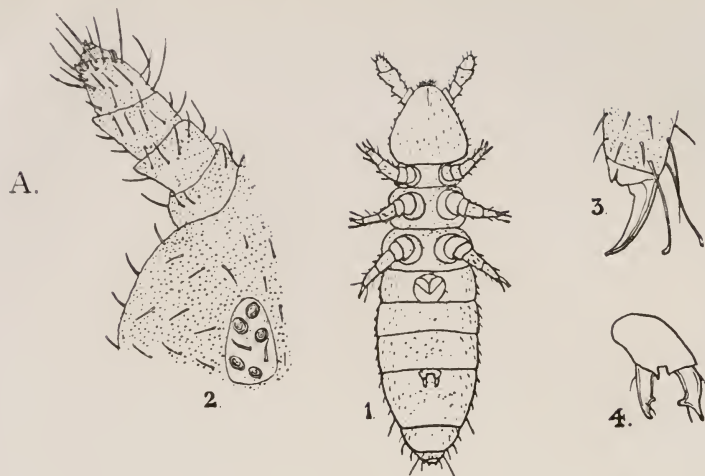
Eylals extendens (Müll.)—Lough Gill; fairly typical specimen.

Eylals sp.—Lough Gill; a form with small eye-plates shaped rather like those of *E. Soari*, Piersig, possibly an undeveloped form of that species.

Hydrachna conjecta, Koen.—Examples of this species, with typical ribbon-shaped prolongation of the eye-plates, were secured in Lough Gill.

Hydrachna distincta, Koen.—Specimens of an *Hydrachna* taken in the lakelets near Rosses Point seem to be identical with *H. distincta* Koen., though the record must be given with reserve, as there are one or two points of structure which need verification. The paired dorsal eye-plates (fig. 4) are very similar to those of Koenike's species, except that they appear to be larger (length, .82 mm.) in our species, and less curved. The papillæ studding the skin on the anterior parts of the animal are long and conical, on the back and posterior parts they are slightly longer and shaped like the teeth of a saw. The only other species with which it might be confused is *H. conjecta* Koen. but the structure of the eye-plates and papillæ seem to mark it off from that species.

¹ Piersig, *Annuaire du Musée Zool. Acad. Impériale des Sciences de St. Petersbourg*, ix., 1904.



A. XENYLLA BREVICAUDA. See p. 198
B. DETAILS OF HYDRACHNIDÆ.

Diplodontus despiclens (Müll).—Lakes at Rosses Point.

Hydryphantes ruber (De Geer).—Lakes at Ballysadare.

Arrhenurus securiformis, Piersig.—In pools on the shores of Lough Gill. A rare species usually occurring singly..

Arrhenurus Moebii, Piersig.—We were fortunate in securing this species, an addition to the list of British Water-mites, in pools on the shore of Lough Gill near Rockwood. *A. Moebii* (fig 3), belongs to the long-tailed division (sub-genus *Megalurus*) of the *Arrhenuri*, of which we have about twelve species recorded from Britain. It differs strikingly, however, from all of these. Characteristic of the species are the two small hyaline processes which project beyond the apex of the body appendage in the male; immediately over these is seen a small sharply-pointed petiolus. Anterior to this again is a small prominence surmounted by a semicircle ridge, and a small rather obscure mark, shaped like an inverted crown. All of the characters agree excellently with Dr. Piersig's description, except for the absence of a pair of long hairs on the end margin of the body—where there should be a pair on each side. These hairs, however, are easily broken off. The body appendage also is rather wider at the base than in Piersig's figures.¹

A. Moebii was discovered about five years ago by Dr. R. Piersig in a lake (Kaltenbach See), in the Black Forest, and so far as I am aware the present is the second recorded occurrence of the species. It may well prove to be a lake-frequenting mite, of which we have at least one other species—*A. Kanei*—which inhabits certain lakes in Ulster, and would seem to be a fairly deep-water form.

Mideopsis orbicularis (Müll).—Glencar Lake.

Lebertia sp.—Specimens of at least two species of *Lebertia*, yet to be identified, were taken in streams near Ballysadare, and in Lough Gill.

Sperchon sp.—A *Sperchon*, closely resembling *S. glandulosus*, Koen., or perhaps some allied species, occurred amongst aquatic plants in a rapid stream near Ballysadare.

Limnesia histrionica (Herm.) } Common in Lough Gill, and in
Limnesia maculata (Müll.) } lakes at Rosses Point.

Hygrobatas reticulatus (P. Kram.)—Ballysadare, and in Glencar Lake.

H. longipalpis (Kerm.)—Lough Gill.

Atax crassipes (Müll.)—Lough Gill.

Piona conglobata (C. L. Koch.)—Lough Gill.

Piona nodata (Müll.)—Glencar Lake.

Piona rotunda (P. Kram.)—A varietal form of this species is abundant in Glencar Lake. The genital field is larger than in the type form, and carries a greater number of discs (35 to 40). In this respect it is intermediate between *P. rotunda* and *P. disparilis*, Koen. The palps are of robust build, bearing three well marked pegs at the end of the fourth segment. The type form is, however, very variable.

¹ "Deutschlands Hydrachniden," pl li., figs. 119a—d.

Plona rufa (C. L. Koch.)—Common in Glencar Lake, and in Lough Gill.

EXPLANATION OF PLATE 10, B.

Fig. 1, *Eylais bicornuta*, sp. nov. Eye-plate, magnified about 86 times. Fig. 2, side view of mouth parts (capitulum), magnified about 35 times, Fig. 3, *Arrhenurus Moebii*, Piersig. Male, dorsal view without legs or palps, magnified. Fig. 4, *Hydrachna distincta*, Koen. Left eye-plate, one of the paired eyes, and central unpaired eye, magnified about 62 times.

Dublin.

CRUSTACEA.

DECAPODA.

BY W. RANKIN.

Only the ordinary common shore species of this order were observed. It is noteworthy, however, that, on the shore of Ballysadare Bay by Glen Lodge, *Portunus armatus* was extraordinarily abundant, more common than even *Carcinus mænas*.

Belfast.

AMPHIPODA AND ISOPODA.

BY ROBERT PATTERSON, M.R.I.A.

At Lissadill, *Talitrus locusta* was fairly common, but *Orchestia littorea* was swarming under decaying seaweed on pebbles. A few specimens of *Orchestoidea Deshayesii* were taken on the sea-shore, and *Gammarus pulex* in the little stream in the demesne. *G. pulex* was also found in considerable numbers in Lough Gill and Glencar lake. At Strandhill, *Gammarus locusta* was taken commonly between tide-marks, and *Talitrus locusta* and *Orchestia littorea* on the shore, the latter being much more plentiful than *T. locusta*. Mr. Carpenter has kindly examined the Woodlice I took, and states they are *Porcellio scaber* and *Oniscus asellus* of various ages. *Ligia oceanica* was common under stones on the shore of Ballysadare Bay.

Belfast.

ENTOMOSTRACA.

BY W. F. DE V. KANE, D.L.

Advantage was taken of a boat at Glencar to investigate the entomostracan fauna of the lake. The plankton largely consisted of *Diaptomus gracilis* and *Daphnia hyalina*, var. *galeata*; one or two examples of *Cyclops phaleratus* were noticed. Among the weeds several species were collected, such as *Lynceus quadrangularis*, *L. costatus* (abundant), *Alonella exigua*, *Chydorus sphaericus*, and *C. ovalis*.

Monaghan.

HIRUDINEA.

BY R. F. SCHARFF, PH.D., F.L.S.

Three of the eight Irish species of fresh-water leeches were found by the naturalists at Sligo:—

Piscicola geometra, Linn.—Glencar lake. The fourth Irish record for this scarce species.

Glossiphonia complanata , Linn.	} Lough Gill. These two species are doubtless common through- out Ireland.
Hæmopsis sanguisuga , Linn.	

Dublin.

ACTINOZOA.

BY W. H. GALLWAY.

There was not much opportunity for Anemone-collecting, as there were very few rock-pools, the shore touched upon being mostly sandy. I can therefore only record the capture of five specimens of *Bunodes gemmacea* (Gosse) in the rock-pools at the foot of Knocklane—one full-grown specimen, two half-grown, and two about one-third, all with the columns coloured rose-pink.

On introducing the animals to my tank, I had the pleasure of witnessing the birth of a young Anemone, which soon attached itself to the rock and expanded its tentacles.

In addition to the foregoing, I only noticed *Actinia mesembryanthemum*, which was common, and also a few specimens of *Bunodes crassicornis*.

Belfast.

III. — BOTANY.

PHANEROGAMIA AND PTERIDOPHYTA.

BY R. LLOYD PRAEGER, B.E.

To botanists, the dominating interest in the flora of the Sligo district lies in the alpine plants of the Ben Bulbin range, on which one of our Irish alpine—*Arenaria ciliata*—has its only British station, and two others—*Saxifraga nivalis* and *Epilobium alsinifolium*—their only Irish habitat. These mountains have already been thoroughly explored, and but little new was to be expected there. Most of the rest of the district visited during the excursion was not unknown to botanists, yet by no means thoroughly examined, and a fair number of plants new to, or rare in the county, or otherwise interesting, were found. Many of the best finds are due to Mrs. Leebody, whose stay of a week at Rosses Point after the close of the meeting enabled her to pursue the exploration of that neighbourhood. The list of species added to the Sligo flora is as follows:—

<i>Papaver dubium</i> .	* <i>Cichorium Intybus</i> .
<i>P. hybridum</i> .	<i>Chlora perfoliata</i> .
<i>Lotus uliginosus</i> .	‡ <i>Linaria vulgaris</i> .
* <i>Sedum album</i> .	<i>Chenopodium rubrum</i> .
<i>Crithmum maritimum</i> .	<i>Potamogeton heterophyllus</i> .
<i>Æthusa Cynapium</i> .	

These raise the flora of Sligo from 636 species to 647, or, including the interesting plant referred to by Mr. Barrington at the end of these notes, to 648.

Rosses Point, which was explored on the first afternoon, is distinctly interesting. The occurrence, close to sea-level, of *Draba incana*, *Saxifraga aizoides*, and *Juniperus nana*, gives the flora a curiously alpine tinge; and the finding of the Maidenhair is a feature of any day's botanizing. The profusion of Orchids at the time of our visit was particularly noticeable, the species represented being *Listera ovata*, *Ophrys apifera*, *Orchis pyramidalis*, *incarnata*, *maculata*, and *mascula* (in fruit), and *Habenaria conopsea*, *viridis*, *chloroleuca*, and *bifolia*.

At Raghly, the extremely dwarf vegetation of the extensive downs was noted. *Radiola* is a most abundant ingredient here, with such plants as *Anagallis tenella*, *Hypericum humifusum*, *Festuca rothbællioides*, *Selaginella selaginoides*, and an extremely minute form of *Ophioglossum vulgatum*. The best plant which this neighbourhood yielded was *Chenopodium rubrum*, new to District IX. of "Cybele Hibernica." Lissadill, visited the same afternoon, provided a wonderful contrast of vegetation, the luxuriance here being extreme. But the woods in this demesne are comparatively new, and not many rare plants were seen.



KNOCKNAREEA GLEN.

On the day spent on Lough Gill, storm interfered with the search for water-plants, but along the sheltered shores about Doonee some good species were obtained. The woods about Doonee and Rockwood are old native woods; the former spot stands on the limestone, the latter on the gneiss, and a good contrast of vegetation results thereby. *Circaea alpina*, *Sesleria caerulea*, and other conspicuous plants of the Doonee undergrowth give way at Rockwood to *Blechnum Spicant*, *Carex binervis*, and *Athyrium Filix-femina*. At Doonee two interesting leafless saprophytes, *Neottia Nidus-avis* and *Hypopithys multiflora*, represented the forest flora.

Glencar Lake, which was explored with boat and dredge, proved to have a bottom covered with an overwhelming growth of *Tolypella glomerata*, among which *Chara* was mixed. Rising out of this dense jungle, *Potamogeton flabellatus*. *P. lucens*, and *P. perfoliatus* rose to the surface. The finding of a large colony of the beautiful Orchid *Epipactis palustris* was a pleasant feature of the afternoon. High up on the cliff the Maidenhair was gathered in its old station. The walking party who crossed the bog-covered plateau to the cliffs of Annacoona saw the alpine flora at its best—*Arenaria ciliata* in quantity, *Draba incana*, *Cochlearia alpina*, *Silene acaulis*, *Saxifraga aizoides*, *S. hypnoides*, *Sedum Rhodiola*, *Sesleria caerulea*, *Poa alpina*, *Asplenium viride*.

The day devoted to Carrowmore and Knocknarea was a varied one as regards botany; the wonderful Hart's-tongue flora of the Glen (see Plate II), the heath associations of Knocknarea, and the dune flora below Strandhill gave interesting contrasts of vegetation. By the roadside south of Strandhill was observed one of the best examples of the bending of trees by wind that the party had ever seen—two Ash-trees, growing in the western fence, and arching right across the road, almost at right angles to their trunks.

The party who visited Gleniff on Sunday noted the abundance of the characteristic mountain flora at about 1,000 feet, at the base of the cliff below the great cave. Here grew in profusion *Arenaria ciliata*, *Draba incana*, *Silene acaulis*, *Saxifraga aizoides*, *S. hypnoides*, *Sedum Rhodiola*, *Asplenium viride*; and the rare *Galium sylvestre* was gathered more sparingly.

The following new stations for plants, or confirmation of old stations, appear to merit publication, taking into account the matter already available in "Cybele Hibernica" and "Irish Topographical Botany." I have to thank Mrs. Leebody, Miss Kidd, Miss Knowles, and Miss E. M'Intosh, for placing at my disposal their notes and specimens, from which the notes which follow are mainly compiled. When a plant was found by only one member, the name of the finder is added.

Ranunculus Auricomus, L.—Doonee Rock.

Papaver dubium, L.—Rosses Point, abundant in one field—Mrs. Leebody. Raghly—R. Ll. P.

P. hybridum, L.—With *P. dubium* at Rosses Point, but more sparingly—Mrs. Leebody.

Meconopsis cambrica, Vill.—Plentiful by the stream north of the west end of Glencar Lake (apparently the King's Mountain station of Barrington and Vowell).

Draba incana, L.—Rosses Point golf-links.

Cakile maritima, L.—Rosses Point—G. Fogerty. Raghly—Mrs. Leebody.

Lychnis diurna, Sibth.—Raghly—Miss Knowles. Lissadill—R. Ll. P.

Hypericum dubium, Leers.—Rosses Point—Mrs. Leebody.

H. humifusum, L.—Rosses Point. Raghly—Miss Kidd.

Radiola linoides, Roth.—Abundant at Raghly.

Lotus uliginosus, Schk.—Rosses Point—Mrs. Leebody.

Alchemilla alpestris, Schmidt.—Lissadill—Miss Knowles.

Saxifraga aizoides, L.—By the sea-shore, north side of Rosses Point, plentiful for about a quarter of a mile—Mrs. Leebody.

S. tridactylites, L.—North of Glencar Lake, Co. Sligo—Miss Knowles.

***Sedum album**, L.—Sea-cliffs near Rosses Point—Mrs. Leebody.

Circaea alpina, L.—Lissadill—Miss Knowles.

Crithmum maritimum, L.—Rocks at the south end of the strand at Rosses Point—Mrs. Leebody.

Æthusa cynapium, L.—Both sides of Rosses promontory—Mrs. Leebody.

Gallium sylvestre, Poll.—In Gleniff, north of Annacoona at the base of the cliffs—R. Ll. P.

***Cichorium intybus**, L.—Plentiful in a grass field at Rosses Point—Mrs. Leebody.

Hypophthalmis multiflora, Scop.—Two specimens near Doonee Rock—R. Ll. P.

Chlora perfoliata, L.—Rosses Point—R. Ll. P. Carrowmore.

Lithospermum officinale, L.—Doonee Rock—Mrs. Leebody. Ballysadare—Miss M'Intosh.

Hyoscyamus niger, L.—Raghly—Miss Kidd.

†**Linaria vulgaris**, L.—Rosses Point, in wild ground, but near houses—Mrs. Leebody.

Orobanche hederæ, Duby.—Rosses Point—Mrs. Leebody. Knocknarea Glen—Miss M'Intosh.

Scutellaria galericulata, L.—Near Doonee Rock—Miss Knowles. Near Ballysadare—Miss M'Intosh.

Galeopsis versicolor, Curt.—Two miles east of Grange—R. Ll. P.

Chenopodium rubrum, L.—Raghly, abundant—Mrs. Leebody.

Beta maritima, L.—Raghly, rare—Mrs. Leebody.

Populus tremula, L.—High limestone cliffs of Glencar, in Co. Leitrim—R. Ll. P.

Empetrum nigrum, L.—Plentiful along the scarp north of Glencar Lake, on the Sligo side.

Juniperus nana, Willd.—Locally abundant at Rosses Point,

- Epipactis latifolia**, All.—Near Doonee Rock—Miss Knowles.
E. palustris, Crantz.—West end of Glencar Lake.
Ophrys apifera, Huds.—Rosses Point and Lissadill—Miss M'Intosh.
 Knocknarea—Miss Kidd.
Potamogeton plantagineus, Duct.—Lissadill—R. Ll. P.
P. heterophyllus, Schreb.—In Lough Gill near Doonee Rock.
P. lucens, L.—Lough Gill—Miss Knowles.
P. zizii, Roth.—Lough Gill—Miss Knowles.
Cladum mariscus, R. Br.—By Lough Gill near Doonee Rock.
Carex dioica, L.—Scarp north of Glencar Lake, Co. Sligo—Miss Knowles.
C. hudsonii, Ar. Benn.—Edge of Lough Gill at Rockwood—R. Ll. P.
C. xanthocarpa, Degl.—By Lough Gill near Doonee Rock—Miss Knowles.
C. vesicaria, L.—By Lough Gill at Doonee Rock.
Millium effusum, L.—Doonee Rock—Miss Knowles. Rockwood—R. Ll. P.
Sesleria caerulea, Arduin.—An outlying colony on Doonee Rock.
Festuca rottbœllioides, Kunth.—Raghy.
F. sylvatica, Vill.—Near Doonee Rock—Miss Knowles. Rockwood—R. Ll. P.
Hymenophyllum unilaterale, Bory.—Hill behind Doonee Rock—Mrs. Leebody.
Adiantum Capillus-Veneris, L.—Base of high cliff west of Glencar falls—W. Holland. North shore of Rosses Point—J. White, jun., and subsequently Mrs. Leebody, “in crevices of the rocks close to the sea, about eight feet from the ground, 7 or 8 small plants.”
Ophloglossum vulgatum, L.—An extremely dwarf form at Raghy—Mrs. R. Ll. Praeger.
Equisetum palustre, L., var. **nudum**, Newm.—By Lough Gill near Doonee Rock—Miss Knowles.

Dublin.

SISYRINCHIUM ANGUSTIFOLIUM ON THE BEN BULBEN RANGE.

BY R. M. BARRINGTON, F.L.S.

On Sunday, July 24, when botanizing on the Ben Bulben range in company with Mr. A. H. Evans, of Cambridge, *Sisyrinchium angustifolium* was discovered growing plentifully in the rushy fields at the foot of the talus, on the south side of the range, and on the Glencar side of the steep gully descending from the “King’s Mountain” of the Ordnance Survey map. There is no need to conceal the locality, as the plant extended over six or seven fields. I questioned the owner of one of them, and he said the pasture had not been disturbed for over twenty years. The elevation appeared to be about 600 feet, but I had not an aneroid or Ordnance map.

Mr. Vowell and I did not visit this particular spot in 1884. The last time I saw this plant growing was at Woodford, near Portumna, in 1870, when Prof. E. P. Wright asked me to accompany him on a botanical expedition there.

I have been always inclined to consider *Sisyrinchium* indigenous in Ireland, and the Ben Bulbin locality does not alter my opinion.

I may mention that for eight or ten years subsequent to 1870 the Woodford *Sisyrinchium* was grown in the garden here, and in at least three different years I scattered its seeds over a moist coarse meadow by the Enniskerry River, but this method of propagation was always unsuccessful, for I never found a single specimen. Possibly it may be sown with grass seeds on ploughed land.

Bray.

BRYOPHYTA.

BY DAVID M'ARDLE.

[Collected for the R.I.A. Fauna and Flora Committee.]

As the records of Mosses and Liverworts from Sligo and Leitrim are few in comparison with other counties, I seized every opportunity of collecting during the Conference week. Therefore I selected such ideal collecting ground as Hazelwood demesne, and Rockwood on the shores of Lough Gill; and my hunting ground about Glencar was confined to the woods and rocks near the waterfall and the Swiss Valley, thus saving the time which would be spent on the walk across the plateau, where, had time permitted, I might have collected some alpine or sub-alpine species of Mosses and Liverworts which are rarely found at low elevations.

The number of Liverworts collected is very small, due no doubt to the dense growth of the larger vegetation, but they are highly interesting. This scarcity was particularly noticeable in Knocknarea Glen; probably the spring time would be the best to collect these plants in this shady ravine, in which, under the canopy of vegetation, lie forest trees in various stages of decay, overrun with mosses, which seem to quickly cover every available spot.

Anomodon viticulosus, one of our finest Mosses, hangs in festoons from the damp rocks which wall the sides of this glen; the rocks and stones are covered with luxuriant specimens of *Climacium dendroides* and *Thamnium alopecurum*; on the face of the wet rocks *Hypnum commutatum* and other lime-loving mosses luxuriate.

The number of Liverworts collected during the excursion is 56. Of these 26 are additions to Co. Sligo or Co. Leitrim, or to District IX. in the Irish List¹; these are marked with an asterisk.

¹ D. M'Ardle, List of the Irish Hepaticæ. *Proc. R. I. Acad.*, vol. xxiv., sect. B., no. 13, 1904.

The number of Mosses collected is 84. Many of them are rare, such as *Hypnum irriguum*, *Amblystegium confervoides*, &c.; and the appended list, though provisional only, may be taken as the fullest account we possess of the Mosses from the Counties of Sligo and Leitrim.

The identification of these plants involves a considerable amount of microscopic work, which takes time to accomplish; and I should not have been able to present both lists for this number of the *Irish Naturalist* were it not for the kind assistance given to me by the Rev. Canon Lett, to whom I offer my best thanks.

All the stations belong to Co. Sligo, except those in Glencar, which are in Co. Leitrim.

MUSCI.

Sphagnum cymbifolium, Ehrh.—Collooney, and shores of Lough Gill.

S. papillosum, Lindb.—Bog among rocks, Collooney.

S. rigidum, Schp., var. **compactum**, Schp.—Very fine at Collooney.

S. acutifolium, Ehrh.—Collooney.

Var. **rubellum**, Russ.—Collooney.

Var. **flavo-rubellum**, Warnst.—Knocknarea.

Andreæa alpina, Smith.—On rocks at Collooney.

Polytrichum nanum, Neck.—Knocknarea Glen.

P. juniperinum, Willd.—Collooney and Glencar.

P. commune, L.—Hazelwood, Knocknarea Glen, Glencar.

Ditrichum flexicaule, Hampe.—Strandhill, Raghly, Knocknarea.

Dicranella squarrosa, Schp.—On boggy ground at Hazelwood.

Campylopus flexuosus, Brid.—On peat at Glencar; Collooney.

C. atrovirens, De Not.—Among damp rocks at Collooney.

Dicranum scoparium, Hedw.—Hazelwood demesne, Lissadill, Knocknarea Glen.

Var. **spadiceum**, Boul.—Among damp rocks at Collooney; Glencar woods; Hazelwood.

D. majus, Turn.—On decayed wood in Glencar; Hazelwood; Knocknarea Glen.

Leucobryum glaucum, Schp.—Among damp rocks at Collooney.

Fissidens adiantoides, Hedw.—Strandhill, Lissadill, Knocknarea Glen.

F. taxifolius, Hedw.—Clay banks at Lissadill.

Grimmia apocarpa, Hedw.—On rocks at Collooney.

G. pulvinata, Smith.—Rockwood; old walls about Sligo; Knocknarea Glen; Drumcliff; wall near the Cottage at Glencar.

Racomitrium lanuginosum, Brid.—Among rocky heaths, Collooney, Swiss Valley in Glencar, Knocknarea Glen. Annacoona with *Arenaria ciliata* (Miss M. C. Knowles.)

R. protensum, Braun.—On rocks in the river at Collooney.

- Ptychomitrium polyphyllum**, Färnr.—On rocks at Collooney and Knocknarea Glen.
- Hedwigia ciliata**, Ehrh.—On rocks, Strandhill, Collooney, Knocknarea Glen, and Swiss Valley in Glencar.
- Tortula muralis**, Hedw.—Old walls about Sligo; Drumcliff, Glencar, Knocknarea Glen.
- T. ruraliformis**, Dixon.—Strandhill and Raghly.
- Barbula tophacea**, Mitt.—Wet rocks in Knocknarea Glen.
- B. fallax**, Hedw.—Knocknarea Glen.
- B. recurvifolia**, Schp.—Strandhill and Raghly.
- B. revoluta**, Brid.—Lissadill.
- Weissia verticillata**, Brid.—On wet rocks, Knocknarea Glen and Lissadill.
- Trichostomum crispulum**, Bruch.—On rocks, Hazelwood and Knocknarea Glen.
- T. mutabile**, Bruch.—Knocknarea Glen.
Var. **ilitorale**, Dixon.—Strandhill and Raghly.
- T. nitidum**, Schp.—Knocknarea Glen.
- T. tortuosum**, Dixon.—On rocks, Knocknarea Glen and Glencar.
- T. fragile**, Dixon.—On rocks, Knocknarea Glen.
- Zygodon Mougeotii**, B. & S.—Lissadill, on damp rocks.
- Z. viridissimus**, Brown.—On trees, Lissadill.
- Ulota crispa**, Brid.—On the trunks of trees, Hazelwood.
Var. **crispula**, Hamm.—On trunks of trees, Hazelwood.
- U. phyllantha**, Brid.—On the trunks of trees, Hazelwood; on rocks at Strandhill, Raghly, and Glencar.
- Orthotrichum affine**, Schrad.—On trees at Hazelwood and Glencar.
- Splachnum ampullaceum**, L.—On the ground among damp shaded rocks at Collooney, very fine specimens.
- Physcomitrium pyriforme**, Brid.—River bank at Collooney.
- Funaria hygrometrica**, Sibth.—Knocknarea Glen, Strandhill, Raghly, and Glencar.
- Breutella chrysocoma**, Lindb.—Damp rocks in Knocknarea Glen.
- Bryum filiforme**, Dicks.—Strandhill and Raghly.
- B. pseudo-triquetrum**, Schwg.—Damp banks at Hazelwood.
- B. capillare**, L.—Old walls about Sligo; Knocknarea Glen.
- Mnium undulatum**, L.—Bank in Knocknarea Glen; Glencar; Collooney.
- M. punctatum**, L.—Strandhill, Knocknarea.
- Fontinalis antipyretica**, L.—River at Collooney.
- Cryphæa heteromalla**, Mohr.—On the trunks of trees at Lissadill.
- Neckera crispa**, Hedw.—On the trunks of trees in Knocknarea Glen.
- Homalia trichomanoides**, Brid.—On the trunks of trees at Hazelwood, Glencar, and Collooney. On rocks in Knocknarea Glen.
- Pterygophyllum lucens**, Brid.—On damp banks at Hazelwood. Very fine near the waterfall in Glencar (W. F. Gunn). Knocknarea Glen.

- Porotrichum alopecurum**, Mitt.—On rocks at Lissadill. On decayed wood at Hazelwood, very fine specimens (Mrs. R. Ll. Praeger). Knocknarea Glen. Glencar, very fine in Swiss Valley.
- Anomodon viticulosus**, Hook & Tayl.—On rocks in Knocknarea Glen; Glencar, Hazelwood.
- Climacium dendroides**, W. & M.—Damp bank at Hazelwood (Mrs. R. Ll. Praeger). Glencar, very fine on decayed wood near the waterfall. Lissadill; Knocknarea Glen.
- Isoetecium myurum**, Brid.—On trunks of trees in Glencar.
- Camptothecium lutescens**, B. & S.—Strandhill, Knocknarea, Raghly.
- Brachythecium rutabulum**, B. & S.—On the trunks of trees in Glencar; Lissadill.
- B. velutinum**, B. & S.—On rocks at Hazelwood.
- B. populeum**, B. & S.—Knocknarea Glen, Strandhill. Raghly.
- B. pseudo-plumosum**, B. & S.—On rocks near waterfall, Glencar.
- B. purum**, Dixon.—River bank in Glencar; Lissadill, Knocknarea Glen, Hazelwood.
- Eurhynchium Swartzii**, Hob.—Damp banks in Glencar; Lissadill.
- E. piliferum**, B. & S.—Hazelwood demesne.
- E. striatum**, B. & S.—Hazelwood.
- E. rusciforme**, Milde.—On rocks in the river at Collooney; Knocknarea Glen.
- E. confertum**, Milde.—On stones at Lissadill.
- Plagiothecium undulatum**, B. & S.—Damp banks at Collooney, Glencar, Hazelwood.
- Amblystegium confervoides**, B. & S.—In a cavern in Knocknarea Glen (W. F. de V. Kane).
- A. irriguum**, B. & S.—On rocks in the river at Collooney.
- A. filicinum**, De Not.—Knocknarea Glen, Strandhill.
- Hypnum commutatum**, Hedw.—On wet rocks, Knocknarea Glen.
- H. cupressiforme**, L.—Strandhill, Lissadill, Glencar, Hazelwood. Var. **filiforme**, Brid.—On trees at Glencar, Hazelwood, Lissadill. Var. **elatum**, B. & S.—Strandhill and Lissadill.
- H. molluscum**, Hedw.—Knocknarea Glen, Collooney (very fine), Hazelwood.
- Hylacomium splendens**, B. & S.—Strandhill, Knocknarea Glen, Glencar.
- H. triquetrum**, B. & S.—Strandhill, Lissadill, Collooney, Hazelwood, Glencar.

HEPATICÆ.

- Frullania Tamarisci**, Linn.—On the trunks of trees, Glencar, Hazelwood demesne, and Rockwood. On rocks near the sea at Raghly; Knocknarea Glen.
- ***F. fragilifolia**, Taylor.—On moss-covered trunks of trees at Glencar, Hazelwood, and Rockwood.
- ***F. germana**, Taylor.—On trees at Glencar and Hazelwood.
- F. dilatata**, Linn.—On trees at Glencar, Hazelwood, Lissadill.

***Lejeunea Mackalii**, Hook.—On the trunk of a decayed tree near the waterfall in Glencar.

L. serpyllifolia, Dicks.—On trunks of trees in Glencar. On stones on river-bank at Collooney. Shores of Lough Gill; Knocknarea Glen.

*Var. **heterophylla**, Carrington.—On decayed wood near the waterfall in Glencar.

L. patens, Lindberg.—On decayed wood among mosses, Glencar, rare.

***L. flava**, Swartz.—On decayed wood, Glencar. Hazelwood demesne.

***L. minutissima**, Smith.—On the trunks of trees at Lissadill.

Radula complanata, Linn.—On the trunks of trees, Glencar, Hazelwood, Lissadill, Knocknarea Glen.

*Var. **minor**, M'Ardle.—On decayed wood, fertile, Lissadill.

***Trichocolea tomentella**, Ehrhart.—On damp banks at Glencar.

Lepidozia reptans, Linn.—On peat at Collooney.

L. setacea, Web.—On peat and decayed wood at Collooney.

Kantia trichomanis, Linn.—Glencar woods, Hazelwood, Rockwood, Knocknarea Glen.

***K. arguta**, Mont. et Nees.—Bank near the waterfall in Glencar.

Cephalozia catenulata, Huben.—On decayed wood at Collooney.

***C. lunulæfolia**, Dumort.—On decayed wood at Collooney.

C. bicuspidata, Linn.—Glencar woods, Collooney, Hazelwood.

***C. connivens**, Dicks.—On decayed wood at Hazelwood; Collooney.

C. sphagni, Dicks., Spruce.—On damp bank at Glencar. On *Sphagnum* at Knocknarea. Shores of Lough Gill.

***C. divaricata**, Smith.—On decayed wood at Glencar.

Adelanthus decipiens, Hook.—On damp rocks at Hazelwood, rare.

Scapania resupinata, Linn.—On rocks in Glencar, Hazelwood, Collooney, Rockwood.

S. undulata, Linn.—Hazelwood.

*Var. **procerior**, N. ab E.—Hazelwood.

***S. uliginosa**, Swartz.—On wet rocks at Hazelwood.

S. curta, Mart.—Among *Trichostomum tortuosum* in Glencar.

Diplophyllum albicans, Linn.—On tree Glencar, Hazelwood, Collooney, Rockwood. Common along the shores of Lough Gill.

Lophocolea bidentata, Linn.—On damp banks, Collooney, Glencar, Hazelwood, Rockwood, Knocknarea Glen. Common along the shores of Lough Gill.

***L. cuspidata**, Limpr.—On decayed wood, Glencar and Knocknarea Glen.

***L. spicata**, Taylor.—On decayed wood at Hazelwood.

Pedinophyllum interruptum, Nees.—On damp banks Collooney.

Plagiochila asplenioides, Linn.—On rocks, Lissadill. On the trunks of trees, Glencar, Hazelwood, Knocknarea Glen.

*Var. **humilis**, Lindenberg.—On rocks, Hazelwood demesne.

P. spinulosa, Dicks.—Hill near sea at Lissadill; Hazelwood, Glencar.

*Var. **inermis**, Carrington.—Lissadill.



CALCAREOUS TUFFA IN KNOCKNAREA GLEN.

A. *Weissia verticillata*.

B. *Hypnum commutatum*.

C. Marsh Thistle (*Cnicus palustris*).

- Jungermania riparia**, Taylor.—On wet rocks, Knocknarea Glen.
- J. crenulata**, Smith, *var. **gracillima**, Smith.—Damp bank in Glencar.
- ***J. inflata**, Hudson.—On peat at Collooney.
- ***J. turbinata**, Raddi.—Knocknarea Glen, on wet rocks.
- J. ventricosa**, Dicks.—On decayed wood, Glencar, Collooney.
- *Var. **porphyroleuca**, Limpr.—On *Sphagnum* on Knocknarea.
- J. incisa**, Schrader.—Knocknarea Glen, Strandhill, Collooney.
- Saccogyna viticulosa**, Linn.—Hazelwood, Glencar, Knocknarea Glen, Lissadill.
- Pellia epiphylla**, Linn.—Damp banks, Hazelwood, Glencar waterfall, Knocknarea Glen.
- P. calycina**, Taylor.—On wet rocks at Glencar waterfall, Hazelwood, Knocknarea Glen.
- Aneura multifida**, Linn.—Damp banks, Glencar, Knocknarea Glen, Collooney.
- ***A. latifrons**, Lindberg.—On decayed wood at Glencar.
- ***A. pinguis**, Linn.—On wet rocks at Glencar.
- Metzgeria furcata**, Linn.—On the trunks of trees at Hazelwood, Rockwood, Lissadill, Knocknarea Glen, Collooney, Glencar woods.
- ***M. conjugata**, Lindberg.—On the trunks of trees, Collooney, Knocknarea Glen, Glencar.
- Marchantia polymorpha**, Linn.—Knocknarea Glen, river bank at Sligo.
- Conocephalus conicus**, Neck.—Lissadill, shores of Lough Gill, Glencar waterfall.
- ***Lunularia cruciata**, Linn.—Old walls by the River Garvogue, Glasnevin.

NOTE ON PLATE 12.

The photograph shows one of the large bosses of calc-sinter or "petrified moss" often met with in limestone districts. The oozing water, highly charged with lime in solution, begins to evaporate on exposure to the air, and, losing carbonic acid, the excess of calcium carbonate is deposited. On this wet spongy material mosses begin to grow, and these, by decomposing the carbonic acid in the water, materially assist the process of precipitation, and their lower leaves and branches become coated with a calcareous crust, the tips of the shoots continuing to grow and to enlarge the boss. B in the plate is one of the large Hypnum, *H. commutatum*. A is a smaller more compact moss (*Weissia verticillata*). Two liverworts are also present, *Pellia calycina* and *P. epiphylla*. While photographing this boss, Mr. Welch observed some small dead land-shells, of the genera *Helix* and *Hyalinia*, undergoing the process of calcification in the sinter—an interesting illustration of the manner in which shells now extinct have been preserved in ancient deposits in limestone districts. The height of the section shown in the Plate is about 12 feet; the Marsh Thistles (C) on the right, 4 feet in height, give the scale.

R. L. L. PRAEGER.

ALGÆ.

DIATOMACEÆ.

BY W. A. FIRTH.

Mr. Welch has sent me some specimens of the mollusc *Planorbis crista* and its var. *nautilus* encrusted with diatoms, dredged in a pond near Kilmacowan old church. I have gone over them very carefully. There is an abundance of *Cocconeis placentula*. Also, sparingly, two *Naviculæ*, which I believe to be *N. radiosa* and *N. ambigua*, but as they are very minute, I cannot be quite positive of these species. Two other species are present—*Epithemia gibba* and *Nitzschia dubia*.

Belfast.

IV.—GEOLOGY.

BY PROF. G. A. J. COLE, F.G.S., M.R.I.A.

The region in which Sligo stands is remarkable for its bold scarps of rock, separating high plateaux from slopes of cultivated land. The Carboniferous limestone series, worn down and depressed in the great central plain of Ireland, is here elevated in the west, and outliers of its lowest strata are found 2,000 feet up on the mountain crests of Connemara and Donegal. Whether we approach Sligo by Boyle or by Enniskillen, we find ourselves in a typically Carboniferous country, where the limestone graduates upwards into the sandstones and shales of the overlying Millstone Grit and Coal Measures. The lower beds are often more yielding than the upper, and become grass-grown, showing occasional grey taluses from the massive rocks above. The higher limestone, with its uniform structure and characteristic vertical jointing, weathers out in superb scarps that remind us of those of the North of England. The approximately horizontal position of the strata gives rise to conspicuous plateau-structure (Plate 13). This is nowhere better seen than from the road just south of Sligo town, where the great inland cliff of Ben Bulbin (1,722ft.) seems to rise immediately behind the city, and is repeated in the outlying mass of Knocknarea upon the south. The terraced hills north of Lough Gill continue the same scenic features, with woods on the sheltered land below, and short upland grass among the grey steps that form the heights. On the south side of the lake, however, the hills



ENTRANCE OF GLENCAR.

Showing the southern cliff-wall of Carboniferous Limestone, which rises a thousand feet above the valley.

To face p. 215.

are more rounded and irregular, with white slabs of bare rock gleaming among the heather and the highland farms. This ridge obviously forms the north-east end of the hummocky masses of the Ox Mountains, and consists of pale fluidal gneiss, often crowded with small garnets. The head of the Slishwood (Rockwood) valley, leading south from the lake, is a good point for the study of these rocks. A later dyke of grey-green serpentine here cuts the main range, and, by its easy weathering, has been worn away and has formed the valley. The Carboniferous strata rest on the gneissic series, or are faulted down against it; and there is every probability, from its general trend, that the axis of the Ox Mountains is occupied by one of the intrusions of granite that occurred in Ireland at the close of Silurian times. At Ballydawley Lake, and in the Slish and Drumahair area, and again near Manorhamilton, dark inclusions of hornblendic rocks occur as lumps in the gneiss; and the latter becomes streaked and banded where these are common. These lumps are so similar to the basic igneous rocks in the old "Dalradian" schists of north-west Ireland, that we may safely regard them as parts of the old floor of the country, caught up by the invading gneiss. Some authors refer the Dalradian rocks to the Precambrian era, others to the Silurian period. A comparison with Connemara makes the latter view difficult to maintain. The gneissic ridge, about 1,000 feet high, affords the most pleasing scenic contrasts with the limestone around the east end of Lough Gill. (Plate 4.) Away in the north, the Dalradian rocks themselves may be seen from Sligo, forming the magnificent sea-cliffs on the southern fringe of Donegal.

Dublin.

NOTE ON PLATES 3, 6, 8, AND 13.

These plates convey an excellent impression of the plateau-structure and fringing cliffs referred to by Prof. Cole. The horizontal bedding is shown on a large scale on Plates 6 and 13, and may be studied in detail on Plate 8. Plate 3, (Ben Whiskin) shows a hill on which denudation has proceeded further, the eastern side being worn to a uniform grassy slope, while the western plunges down in a gigantic cliff, the whole being a very striking and picturesque surviving remnant of the ancient plateau. Plate 8 (Swiss Valley) illustrates a remarkable ravine running apparently along a line of fault at the foot of the great cliff above Glencar Lake, and furnishing one of the most striking pieces of scenery in the Sligo district. The remarkable fissure on Knocknarea, illustrated in Plate 11, which runs *along* the slope of the hill for a distance of over a mile is apparently to be referred to a dislocation and slipping of the land along a strong vertical east-and-west joint-plane.

R. LLOYD PRAEGER.

V. — A R C H Æ O L O G Y .

PREHISTORIC ARCHÆOLOGY.

BY ALEX. D'EVELYN, M.D.

The following rough notes apply to the sandhills visited during the Conference, and to the prehistoric objects collected about the various hut sites on the Sligo coast.

ROSSES POINT.

This place, though it looked promising, did not yield many traces of ancient habitation; some, however, were observed, and one chert scraper, Plate 14, fig. 4, was picked up.

RAGHLY.

On the wind-swept stony ground above the seashore, west of Ardtermon Castle, were found the ordinary objects common to all prehistoric sites.

The shell mounds were composed mostly of Limpet (*Patella vulgata*); but Oyster (*Ostrea edulis*), Cockle (*Cardium edule*), Whelk (*Littorina littorea*), Dog-whelk (*Purpura lapillus*), *Pecten maximus*, and *Macra solida* were fairly abundant. The Dog-whelks in some mounds were split or broken in a manner similar to those found at Dogs' Bay, Connemara, and other hut sites. Flint and chert flakes and cores were abundant over a considerable area; one well-formed chert flake is shown in Plate 15, fig. 4.

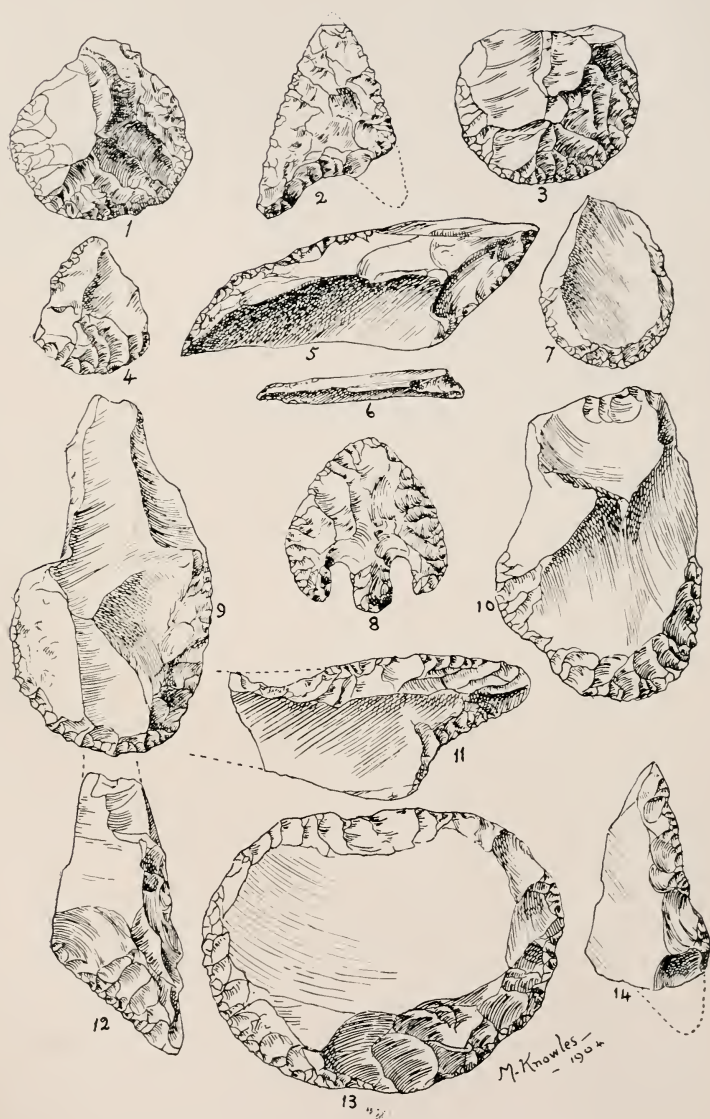
Among the finds at this site were about twenty scrapers of flint, some of which are shown in Plate 14, figs. 1, 7, 9, 10, and 13; and Plate 15, figs. 1, 2, and 3. Plate 14, fig. 3; and Plate 15, fig. 7, are chert scrapers. Six flint knives or parts of knives (Plate 14, figs. 5, 11, 12, and 14; and Plate 15, figs. 5 and 6), were obtained; also two arrow-heads (Plate 14, figs. 2 and 8), and a small flint borer, known as a pigmy (Plate 14, fig. 6). Several disc-stones of quartzite¹ (Plate 16, figs. 1 and 2), a broken anvil-stone, and hammers of fine sandstone were observed. No axes were found, nor was any pottery observed. The only bones at this site were mostly teeth of the commoner domestic animals, as, owing to the weathering and long exposure, the softer bones had practically disappeared.

An interesting point about this site was the quantity of flint, foreign to the district, and the paucity of worked chert implements in a country where Carboniferous limestone and chert is everywhere abundant.

CARROWMORE AND STRANDHILL.

Along the shore for about a mile at Culleenamore, are very extensive low cliffs composed almost entirely of Oyster shells, with a few Whelks and broken pebbles. These deposits vary from one to ten feet in thickness, and occur just above high water mark. They are probably the remains of an ancient raised beach. I believe that when dredging the channel of the Sligo estuary similar layers of oyster shells were discovered.¹

¹ Sligo is named from the river: *Sligeach*, shelly river, (*slig*, a shell).



STONE IMPLEMENTS FROM SLIGO SAND-DUNES.

Half Natural Size.

To face p. 216.]



STONE IMPLEMENTS FROM SLIGO SAND-DUNES.

Half Natural Size.

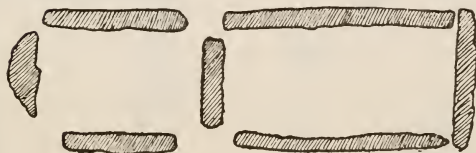
Near this place, at Culleenaduff, were many evidences of ancient habitation; flakes and cores of chert were plentiful, and a stone axe (Plate 16, fig. 3) of the ordinary kitchen midden type was picked up in a field above the raised beach.

On the southern extremity of the sandhills bordering on Ballysadare Bay, on the top of a high sand-dune, is an extensive accumulation of stones of all sizes, mixed with the ordinary marine shells, including broken *Purpuras*. This was evidently a hut site, but it did not yield anything of interest.



A.S.C.

Fig. 1. Kistvaen below Strandhill.



A.S.C.

Fig. 2. Plan of Kistvaen.

From Ballysadare Bay, northwards to Sligo Bay, are very extensive sandhills, which are in parts comparatively modern, as it is stated that the cultivation of the old surface caused the sand to shift and overwhelm an adjacent village and farms. As the dunes are now almost completely covered with grass and bent, very few evidences of prehistoric habitation were observed. In the sandhills, below the village of Strandhill, is a double kistvaen or giant's grave, as it is locally called (figs 1 and 2). It is in good preservation, except that the covering stones have been removed. It is about eighteen feet in length and seven in breadth. The slabs are of limestone, and some of them are nine feet in length.

At the north end facing Sligo Bay is the ancient church of Killespuc-brone (*Kill-easpog-brone*—the church of Bishop Brown). It is now abbreviated into Killespuc, and is charmingly situated on the edge of the sea, on what is evidently the remains of a circular pagan fort.

The graveyard is still used for interments, and some of the recent graves were composed of the pebbles, bones, and shells of the ancient kitchen middens.

STREEDAGH POINT.

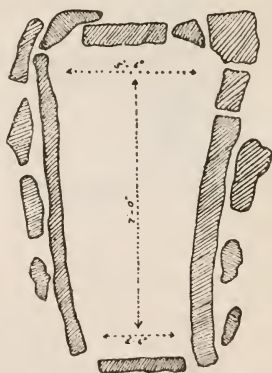
At the end of the road near Streedagh House, are a number of hut sites of stone, together with the usual shell-mounds and broken pebbles. Near one of these huts a broken upper stone of a quern was noticed, but no flint or worked chert could be seen. Bones, which Dr. Scharff has kindly identified as those of a small form of Ox, like the Kerry breed, Irish Hare, large Fox, and Goat, were found among the shell-mounds. Most of the long bones were broken to extract the marrow.

Near one of the huts, two hammer-stones (Plate 16, fig. 4), of a fine-grained quartzite were collected. The larger one measures eight inches by four. On a dune overlooking the sea is a stone circle, 33 feet in diameter (fig. 3). In its centre is a smaller circle or cairn of stones which surrounds the grave (fig 4). It is composed of slabs of limestone and mica-schist, and measures 7 ft. by 5½ ft. at the broadest part, narrowing down to 2½ feet at one end.



A.B.C.

Fig. 3.



A.B.C.

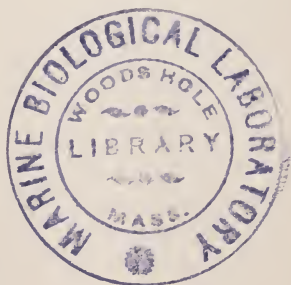
Fig. 4.

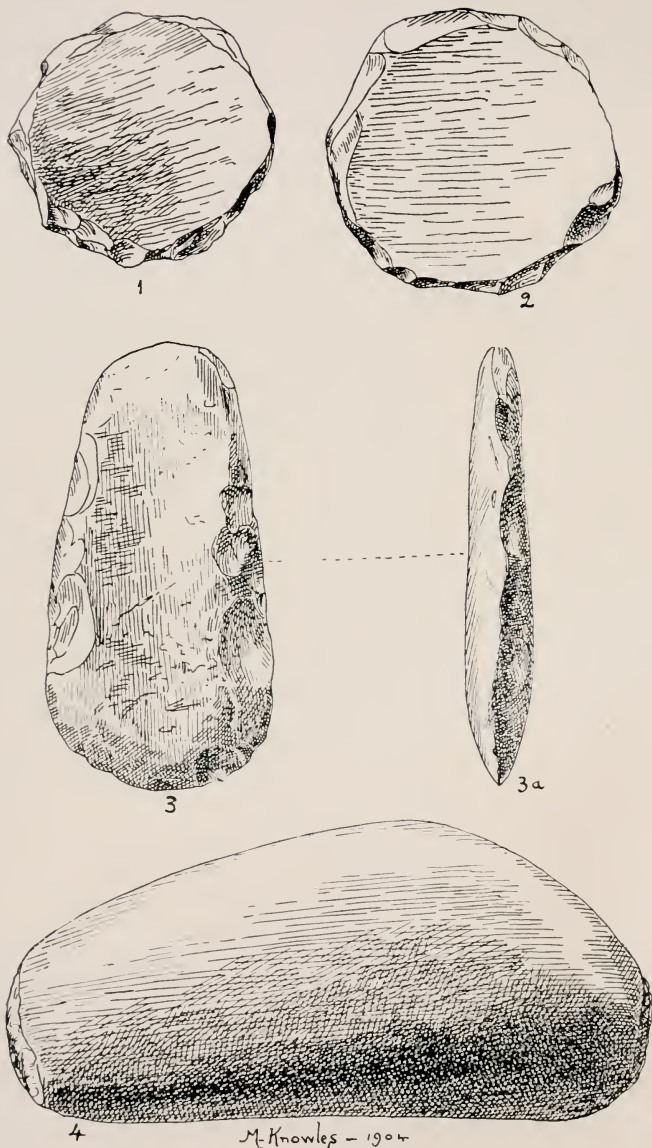
Fig. 3. Plan of stone circle near Streedagh Point.

Fig. 4. Plan of chamber in centre of same.

CARRICKFADDA.

The sandhills from this point northward to Roskeeragh Point, were carefully searched, but as they are mostly covered with bent, no traces of prehistoric occupation were observed.





STONE IMPLEMENTS FROM SLIGO SAND-DUNES.

Half Natural Size.

GLENCAR.

This beautiful valley and lake is called in Irish *Gleann-a-Chairthe*, the glen of the pillar-stone, but its ancient name, as used by the Four Masters, was *Cairthe Muilcheann*.

This excursion was rather outside the limits of the hut sites, but interesting from the fact that the lake contains two crannogs, one at either end.

In the upper crannog tradition states that the first iron sword was forged, and it still bears traces of having been a place of considerable importance in days gone by.

Arrow-heads have been found on Ben Bulbin, and one of our party picked up a flint scraper on a bare spot on Annacoona.

I have to thank Miss Knowles, of Dublin, and Dr. George Fogerty, of Limerick, for their able assistance in searching the sandhills, and also for lending a number of specimens which are illustrated from drawings kindly made by Miss M. Knowles.

Ballymena.

FOLKLORE NOTES.

BY ALEX. D'EVELYN, M.D.

IN Glencar, above the Swiss Valley, on the face of the cliff, is a square white patch on the rock, which is known as Conla Wanla's (or Wandra's) window. The word signifies, I am told, "the old man in the rock." Once in seven years the window opens, and the old man makes his appearance. Anyone fortunate enough to see him, and keep a steadfast eye on him during this interval, will obtain whatever he wishes for. Should, however, his gaze be averted for a single second, the spirit disappears, and the cliff resumes its ordinary appearance, leaving the watcher to await better fortune on a future occasion.

In common with most other parts of Ireland, arrow-heads are locally known as elf-stones, and are used in curing cows that have been elf-shot. The custom is fast dying out, and as the elf-doctor will soon also become extinct, some notes on his method of procedure may be of interest. The following is the method carried out in this district, for particulars of which I am indebted to the Rev. Joseph Meehan, of Creevelea. No sooner does the elf-doctor get his sick call than he is off hot-foot to his patient, well aware of the kindness and fulness of the hospitality in store for him. He does not neglect to bring his precious elf-bag. In this purse are three or four flint arrow-heads, a silver 13d. piece, and three separate coppers, usually bad halfpence. The flints in the pouch are sometimes as many as seven or eight, though only one is used.

One elf-doctor has four flint arrow-heads, which were found near a fort, and are the "identical arrows" discharged by the "gentry" to drive off from the sacred precincts too meddlesome milch cows.

The 13-penny piece must be of silver, and must have a cross on it. That used on one occasion was a silver piece of Charles II.

The elf-doctor now proceeds to examine the cow, and if he finds that the hair stands erect on the animal's back, that the ears are lifeless and hanging, or the tail when twisted fails to right itself, there is a strong probability that the animal has been "struck." This is further confirmed if the actual dent or wound of the arrow-head can be found.

To further ascertain if the beast is "struck," she must be measured from the base of the horns to the last joint of the tail, the measure in use being the forearm—the span from the elbow-joint to the point of the middle finger. The cow is spanned twice from head to tail, then a third time in the reverse order. If these measurements do not correspond, and they seldom do, then the cow is elf-shot and "badly struck."

Then the three-mearing water must be procured—that is, water from a stream where three townlands or parishes meet. If procured before sunrise, so much the better. Then the "erribs" (herbs) are procured, Lady's Mantle (*Alchemilla vulgaris*) in one case being used. In a pail is put the expressed juice of the herbs, the coins (copper and silver), and one flint arrow-head, a pinch of salt, and, finally, the three-mearing water. It is essential that the cow take three sips, or, if necessary, to have it bottled down her throat in three gulps.

The remainder of this curious decoction is sprinkled on her back, and in her ears.

Ballymena.

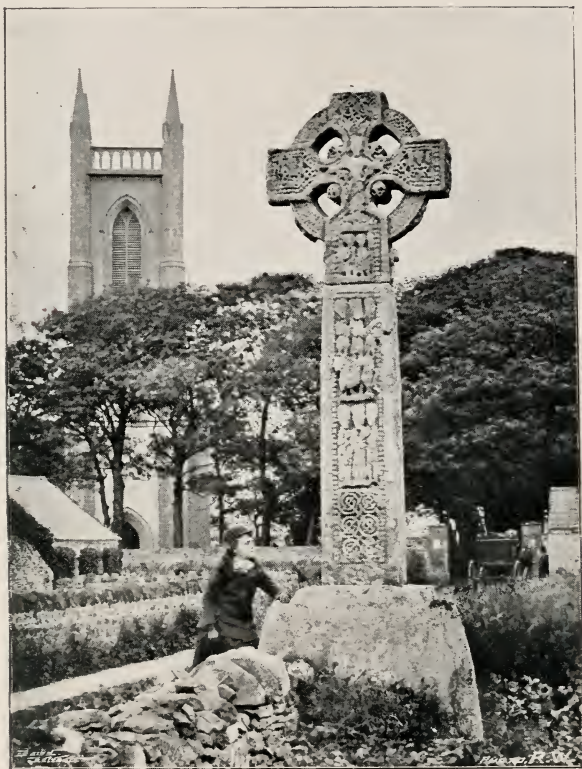
CHRISTIAN ANTIQUITIES.

BY W. J. FENNELL, M.R.I.A.I.

DRUIM-CLIABH NA-G-CROS.

Drumcliff of the Crosses formed one of our brief halts, to inspect the few but interesting relics of what must once have been an ecclesiastical foundation of importance in the time of the early Christian Church in Ireland.

These relics consist of the high cross, rising to 13 feet, which we illustrate, a rude pillar stone (which may be the shaft of an unfinished cross), and the remains of a round tower. Between these two latter objects, the county road carefully winds. We were glad to note that all



R. Weich, Photo.

THE HIGH CROSS OF DRUMCLIFF.

Thirteen feet in height. Hard sandstone.

To face p. 220.]



SLIGO ABBEY.



ONE OF THE STONE CIRCLES ENCLOSING A CROMLEAC AT CARROWMORE.

To face p. 221.]

these "three stony sentinels," as Col. Wood-Martin calls them, bear evidence of careful attention in their old age. This round tower is classified by Miss M. Stokes as belonging to the first or earliest style. Connected with it is the unchristian-like legend that when the wisest man is passing it will fall and kill him. All the men of our party are still alive—their combined wisdom had no effect on its silent dignity. The high cross is worthy of close inspection. Its decoration is not of the highest order of Celtic work, but it has much to commend it. Some of the subjects yet require interpretation, and a decision regarding the mortice holes on the sides still awaits confirmation.

"The Annals"¹ under the date of 871, state that Dunadhack, Lord of Carbury died, and he "lies under hazel crosses in Drumcliff."²

SLIGO ABBEY.

This abbey, which is situate close to the Imperial Hotel, has been almost hidden from view by the march of the encroaching city. Most of our party visited these picturesque old ruins and listened with commendable patience to its history as read out from the old stones themselves—and for which we must refer our readers to the "History of Sligo" by Col. Wood-Martin, who has kindly lent us the blocks of the plan and seal which are here reproduced. (See pp. 222, 224).

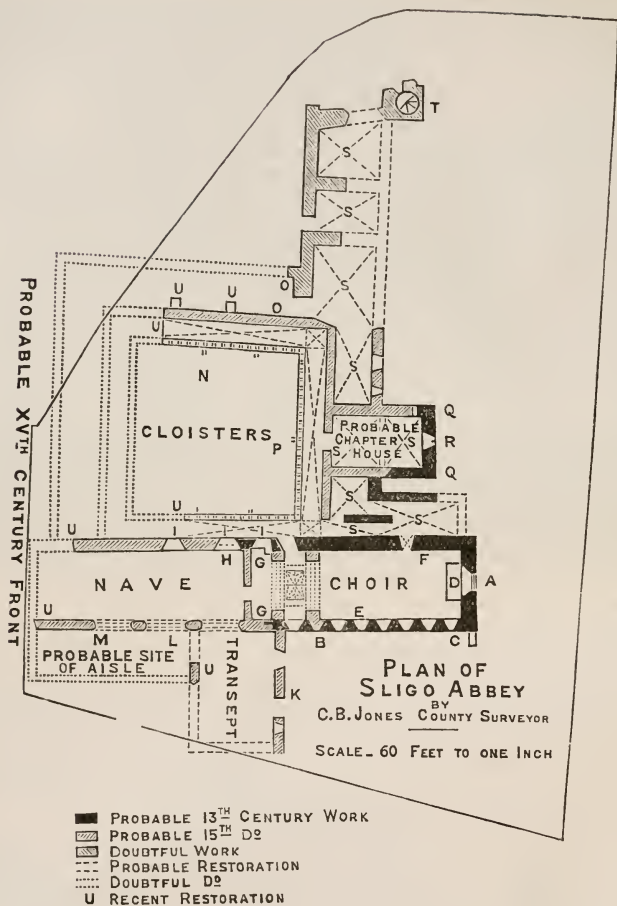
We may, however, be permitted to say that the cloisters are in an extremely fine state of preservation, and well worthy of study, as they are characteristic of the general Irish design of arcading. The visitor would do well to spend more than a passing glance at the imposing array of lancet windows in the south wall of the chancel; they are a noble work of a thirteenth century architect—a "no common man," as Ruskin said of one of his contemporaries. They possess the attribute of growing on one, and creating never-fading impressions.

The design on the seal carries with it great interest, as it shows the west end as it formerly stood with flanking towers for protection, while the usual distribution of monastic buildings, and the respective ages of the various parts, are well defined on the plan.

These buildings are conserved by the Board of Works as a national monument, and since, as a great protector of ancient buildings, this Board is always most eager to take a hint, we venture to suggest that some few of the trees should be removed in order to prevent possible damage.

¹ "The Annals of the Four Masters" might never have seen the light had not those zealous antiquarians found a patron in a Sligo gentleman O'Gara of Coolavin, at whose instigation the compilation was undertaken."—*Wood-Martin*.

² See "History of Sligo," by Col. Wood-Martin, p. 174, also for other obits.



ARDTERMON HOUSE.

Our rendezvous on July 13 was at the ruin of Ardtermon House, once the Irish residence of the Gore-Booth family. With the solitary exception of a plain lancet-headed door, every vestige of architectural, and most of the internal constructive detail has disappeared; but the sturdy old walls reveal the interesting fact that it was one of the fortified mansions of the district, and no doubt had many a time to fight for dear life with a people labouring from a sense of oppression, either imagined or real. Fortified mansions were by no means uncommon in Ireland in its stormy history that followed Elizabeth's time, and we know of one, at least, still inhabited, but with more peaceful occupiers.



Drawn by W. J. Fennell.

This long thin house has a rather curious form, flanked in front by circular bastions which commanded the front and sides, and with rooms large enough to still form comfortable chambers in times of comparative peace. At the rear of the house extended a large court-yard, commanded by the staircase projection or bastion. The outer walls of the yard were also defended by a circular bastion, so that no portion of the outer walls offered a perfect shelter for an attacking force.

The house consisted of two storeys, and an attic storey, the floors being carried on timber beams, which rested on stone corbels on the lateral walls. Lead was expensive in those days, and iron eaves-gutters were unknown, so that an ingenious construction was adopted to catch the roof-water and to discharge it clear of the building. We illustrate the method as it existed here. (See Plate 19).

Belfast.

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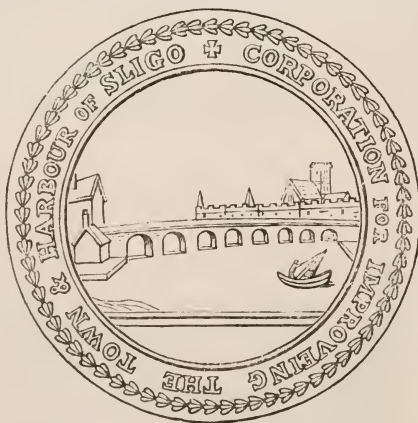
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A GLYCERIA HUNT.

BY R. LLOYD PRAEGER, B.A., M.R.I.A.

DURING the first week of August last I explored the western and southern shores of Strangford Lough in the hope of meeting with *Glyceria festucaformis*, which I have already recorded as occurring along several miles of the eastern shore of the lough,¹ and also near Cloghey Bay, on the Irish Sea littoral². The western side of Strangford Lough presents a bewilderingly sinuous shore-line, further complicated by an outlying archipelago embracing islands of all sizes. To thoroughly examine the sea-margin would occupy a week or a fortnight of steady work; but in three days of about twenty miles walking a day—not to mention a certain amount of wading and swimming—a fair idea was obtained of its floral capabilities. I began at Comber, and on the first day worked carefully down the Comber River, past Castle Espie, Ardmillan, and Sketrick, sampling in passing Reagh Island and Mahee Island. Evening found me below Killinchy, without having seen any trace of the plant. Indeed, the monotonous belt of *Glyceria maritima*, *Carex extensa*, *Suaeda maritima*, *Statice variflora*, and so on, was only relieved by *Cenanthus Lachenalii*, *Glyceria distans*, and *Lepturus incurvatus* at Castle Espie, and, when my eye wandered for a moment from high water mark, by *Agrimonia odorata*, which grew plentifully among a scrub of Hazel and Brambles at the north end of Reagh Island.

The second day opened pleasantly with the finding of *Atriplex portulacoides*, which grew around the head of the bay west of Shamrock Island: a rare plant locally, and hitherto unknown on Strangford Lough. But still no sign of *Glyceria festucaformis* along the mazy shore-line (though strong-growing *G. maritima* occasionally mimicked it) till at length rounding the long peninsula of Ringhaddy, a small colony of characteristic plants gladdened my sight on the eastern shore north of the old castle. A less well-marked plant occurred on the inner bay near by, by the roadside a quarter of a mile west of Ringhaddy quay: I was on the whole inclined to refer it to *G. festucaformis*, and in this Dr. Rendle agrees, but it is not

¹ *Irish Nat.*, xii., 255. 1903. ² *Ibid.*, xiii., 172. 1904.

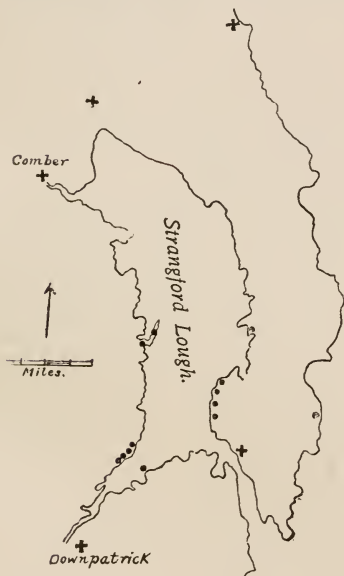
very characteristic. Then for many miles I stumbled along the rough stony margin, which is only occasionally varied by a muddy bay choked with masses of decaying *Zostera*. Late in the afternoon, half a mile south of Killyleagh, at the mouth of the estuary of the Quoile, the grass once again put in an appearance; first one plant, then further on a good colony, then a large quantity, till from Moore's Point to Delamont, in the Quoile estuary, it was the most conspicuous plant of the shore, growing in grand erect tussocks a foot across and two feet high, and thoroughly characteristic. I continued my exploration as far up the Quoile as Ringmore Wood on the Finnebrogue estate, but above Delamont the grass was not seen. A tramp back into Killyleagh completed a long day's walk.

On the third morning I sailed to the entrance channel of the lough, and landed at Audley's Castle, and thence worked along the southern shore, and up the south bank of the Quoile into Downpatrick. For mile after mile the shore was hopelessly infested with cattle and sheep, and the herbage cropped close. Under these circumstances a tiny islet (called Shone's Island on the six-inch Ordnance map), untouched by beasts, lying a quarter of a mile off shore east of Gore's Island, looked most inviting, and clearly demanded exploration. In the absence of other means of locomotion I swam to it, and was well rewarded. The whole islet was in possession of luxuriant *G. festucaformis*, excepting only a dry central knoll, where *Festuca ovina* and *Agropyron repens* were established. I returned literally crowned with the rare grass, a bundle of specimens being securely lashed on the top of my head. Thence into Downpatrick no further trace of the *Glyceria* was seen; but *Agrimonia odorata* was again seen several times before the Steamboat Quay was reached.

A few other plants found on this day may be worth noting. *Juncus glaucus* was frequent from Harry's Island westward. A more interesting rush occurred with it along the raised beach which fringes the shore, backed by a bold bluff of Boulder-clay, east of Shark Island—namely *J. diffusus*, Hoppe. This plant has in Ireland hitherto been recorded only from Killakee Mountain, Co. Dublin. In its Strangford station it occurs in some quantity, mixed with both its supposed parents, *J. glaucus* and *J. effusus*. A peculiar Wheat-grass which also occurred here, and elsewhere on this day's route, is

named by Mr. Arthur Bennett *Agropyron repens*, var. *aristatum*, Doell. On the coast inside the islands called Launches, *Juncus obtusiflorus* grew, with *Ænanthe Lachenalii* and *Lepturus*; and from the train in the evening *Sparganium minimum* was seen in pools at Ballynahinch Junction. But during the three days my eye was so constantly glued to the strip of vegetation along high water mark, that my notebook was almost a blank as regards plants from any other habitat.

The result of this exploration, and of that of last year, is to



Sketch-map showing range of *Glyceria festucaformis* as at present known.

show that the headquarters of *Glyceria festucaformis* lie in the Quoile estuary, in the south-west corner of Strangford Lough. Thence the plant extends northward for some miles, in fair quantity on the eastern side of the lough, apparently very sparingly on the western. In the northern half of the lough, embracing the districts of Ardmillan, Comber, Newtownards, and Greyabbey, it is, so far, an absentee. There is, in addition, the outlying station on the Irish Sea coast near Cloghey Bay, which suggests a much wider range of distribution. It appears that an examination of such of the numerous islands in the lough as are too small to be grazed, would be likely to yield good results, but this interesting piece of work must wait for another season.

I have to thank Dr. Rendle for kindly examining some doubtful specimens. While normal *G. festucaformis* looks utterly different from normal *G. maritima*, the group *Atropis* is, as Prof. Hackel wrote when first naming the Irish plant, a critical one, and I found it difficult in the field to say where strong *G. maritima* stopped and weak *G. festucaformis* began.

“PLAYS” OF BIRDS AND “BALLS” OF FRY.

BY SIR R. LLOYD PATTERSON, D.L., F.L.S.

AMONG the many and various sights that a sea-fisherman, who is also even ever so little of a naturalist, may enjoy, few are more interesting than those locally known by the above names. It is long since these first attracted attention ; in Harris's "History of Down," published in 1744, we find the following:—

"In Carrickfergus Bay, and about the Copland Islands, when the Herrings and Fry are in their passage, great shoals are seen of Codd, Gray-fish, or old Blockans, Gurnard, and Knowds, which are the Gray Gurnard, who all pursue their prey. It is pleasant to come within the play of those fish in a boat. The large fish attack the shoal, which. . . . for safety are often forced to the top, where the Gaunts' or Soland Geese and other water-fowl upon the wing observe them and give warning to their companions, so that in five or six minutes may be seen two or three hundred of these birds striking at their prey from a great height in the air, while the Puffins, Comorants, and other water-fowl dive among them ; and the Codd and Gray-fish tumble about and leap in the water without being frightened by the boat's crew, and rise so near that they are often struck with a gaff or hook fixed at the end of a stick, and drawn into the boat."

Speaking still of Belfast Lough (the "Carrickfergus Bay" of Harris), these plays of birds on fry have long been of interest to me, as we often had to depend on our getting a "dip" of fry to provide bait for our fishing ; but, quite apart from such utilitarian aspects, they are of great interest, and even beauty. Fish are not, as a rule, so abundant in the lough of late years as when Harris wrote ; but their procedure is similar. When the shoals of fry come in, the larger fish and the birds accompany them. Among the fish the most numerous are generally the Grey Gurnard (locally called Knowd or Nowd), Piked Dogfish, and often Mackerel ; next Sea Bream, Cod, Coal-fish (locally called Stanlock), and Pollack (locally called Lythe), with an occasional Ling, and, still more rarely, a Hake.

¹ The old spelling of the word "Gannets."

The bottom-feeding fish, such as Skate, hardly count in this connection. Among the birds may be seen all the commoner species of Gulls in great variety of plumage, indicating differences in age; all the smaller divers, mostly Guillemots and Razor-bills; some Puffins; still fewer Black Guillemots; Cormorants, Gannets, Terns, generally some few Manx Shearwaters, and possibly one or two Skuas. A number of the larger fish must make a simultaneous attack on a shoal of fry below, which are thus driven closer together and towards the surface, when they are noticed by the smaller divers who “go for them” in such a manner that, circling round the outer extremity of the shoal of fry, the fish composing it become still more closely driven into a mass which almost always assumes a globular form, and hence is locally called a “ball.” The upper portion of this ball shows at the surface, and is there exposed to the attacks of the surface-feeding gulls, some of which sit down on the water while others only “dip” on the ball. The Terns dip, and sometimes strike from a slight elevation; while Gannets feed both ways, that is—generally sitting down to their meal, or, less frequently, “striking” obliquely at the ball, also from only a moderate height, but the splash and impact of these great birds soon break up the ball, which scatters, goes down, and disappears. If a Manx Shearwater appears, it sits down among the fry and picks them up from the surface, although, as lately mentioned (*Irish Naturalist* for August, p. 171), I have seen them emerging from below. Over a large ball that had been up for some minutes, and had thus given the birds time to assemble, the scene is an extraordinary one, while the noise made by the varied cries, of several hundreds of them create an almost deafening Babel of discordant sound. The local boatmen speak of the birds “balling” as well as the fry; but by this they only mean that the birds are assembled at and attacking a ball. On approaching a play of fowl to get some fry—either for whitebait for table use, or to use as bait for fishing, one sees the ball of fry, a dull, leaden-coloured globe of varying size from one-and-a-half or two feet up to five or six feet—I have seldom seen them larger in diameter; flashes of silver constantly show all over the visible surface of the ball, as some of the individuals composing it turn their

sides and under parts towards the spectator ; while the Razor-bills and Guillemots may be seen *flying* under water with outspread wings air bubbles adhering to and shining on their plumage.

I extract the following from my notes :—17th August, 1893, Got a dip of fry out of a very big ball to-day. We sailed slowly past it after getting the dip, the ball passing along our port (weather) side, and at the quarter one might have had another dip. We saw several Piked Dog-fish sailing slowly through the now rather spread out and elongated shoal, which looked very beautiful. The Dog-fish were so near I stretched out my hand to catch one by the tail ! Their movements were most easy and graceful. At another ball later we saw two or three large Coal-fish at the very surface. One put his back above the water at the boat's side and could easily have been gaffed. Piked Dog-fish and Knowds were also at this ball. We came to there and very soon caught five fine Stanlocks (*i.e.*, Coal-fish) and a Cod, and lost three or four Stanlocks. We also caught $5\frac{1}{2}$ dozen Knowds and 60 or 70 Dog-fish. The large fish at the balls were most interesting." Another day—26th August—I do not find any mention of balls, but we came to among the birds about $1\frac{1}{2}$ miles off Castlechester and caught 7 Stanlocks, 7 Carp (Sea Bream), 98 Knowds, 4 Mackerel, 3 Whiting, 7 Codling, 1 Skate, and about 50 Dog-fish. Another day in August, some years ago, our present excellent Lord Mayor, Sir Otto Jaffe, and his son, were with me, and were much surprised at what they saw. On sailing up to a ball the boatman Scott gaffed a Codfish, loose, so to speak, and its body being torn open by the gaff, in one moment the floor of the boat was covered with living fry, jumping in all directions, which the cod had just swallowed.

Countless thousands of millions of fry must thus perish, the larger denizens of the deep also levying a heavy toll off them. In a note of mine on the Irish Cetacea, which appeared in the *Irish Naturalist* for August, 1900, I stated that I had often observed the two larger species (meaning thereby the Beaked or Bottle-nosed Whale and Rorqual) change the direction of their course and go straight to a "play" of birds over a "ball" of fry, towards which their attention had been directed when

at the surface by sight, or sound, or both, of the birds hovering and crying over and dipping on the fry. I have sometimes followed and closely watched these whales, and have seen the upper jaw protruded from the water as the animal opened its mouth for the attack. The rush of the whale through the water scatters all the birds and the large fish that are feeding on the ball; and, following closely in the wake of the cetacean, I have sometimes seen the ball divided in two and not yet gone down, which it would do in a very few minutes.

Holywood, County Down.

NEWS GLEANINGS.

Denudation in the Geological Survey.

Geology in Ireland has suffered a loss not easily repaired by the transfer of G. W. Lamplugh, lately head of the Geological Survey here, who has resumed work on the English branch of the Survey. He had endeared himself to every one with whom he came in contact in Ireland, and was already a guide, philosopher, and friend to young geologists throughout the country. W. B. Wright, B.A., of the same department, has been temporarily transferred to England, where he is doing “solid geology” work.

G. H. Carpenter.

G. H. Carpenter, B.Sc., has been appointed to the chair of Zoology in the Royal College of Science for Ireland. A vacancy is thus caused on the staff of the Science and Art Museum, where Mr. Carpenter has laboured for the last sixteen years.

Robert Pride.

During the past summer the Dublin Museum has lost the oldest officer on its staff. Mr. R. Pride, Technical Assistant in the Natural History Division, retires under the “65 rule,” after fifty year’s service. His knowledge of general zoology, of museum technique, and of the history and contents of the institution where he has worked so long, makes his loss a serious one. His colleagues, to whom he has ever been a true and loyal friend, heartily wish him enjoyment in his well-earned rest.

J. N. Halbert.

Our congratulations to J. N. Halbert on his appointment as Technical Assistant in the Science and Art Museum, in succession to Mr. Pride. Mr. Halbert has held a subordinate appointment in that institution for the last twelve years, and we welcome this recognition of his value by his promotion to the permanent staff.

AMONG THE FERMANAGH HILLS.

BY R. LLOYD PRAEGER, B.A., M.R.I.A.

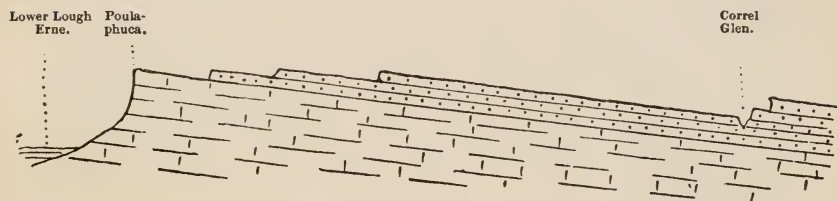
THIS is the record of a wet week—or five days, to be exact. To have three and a half days of rain during that period is surely a liberal allowance. The only thing to do was not to mind it; so I put in an average of twelve hours' field-work each day, and every evening returned, dripping but happy. The district which I wished to explore was that which lies south of the western part of Lower Lough Erne. This area, along with the hilly country stretching southward to beyond Cuilcagh, had already been examined and reported on by S. A. Stewart¹; but the finding, within the last year or two, by an active group of local botanists—Messrs. West, Tetley, Abraham, and M'Cullagh—of such good plants as *Saxifraga aizoides*, *Pyrola secunda*, and *Trichomanes radicans*, pointed to enticing possibilities; an impression not diminished by a visit to the district one day in the July of last year. Accordingly, the services of that most helpful of friends, Mr. Thomas Plunkett, M.R.I.A., were requisitioned, and on the evening of July 2 he drove me down twelve miles from Enniskillen, and duly installed me in a comfortable farm-house overlooking Lough Erne near Church Hill.

The physiography of this district is remarkable. Three different kinds of rock, all laid down during Carboniferous times, produce each its own type of scenery, soil, and vegetation. Massive limestones form the huge grey cliff-ranges of Poulaphuca (or Barr of Whealt) and the grand semicircular wall of Knockmore; and in the Carrick district rise in steep knobby hills, bright green with short grass, with the grey rock showing everywhere between. The softer shales weather into smooth rounded outlines, with the streams sunk down in wooded glens. Heavy clay lands prevail here, with pasture or meadow full of rushes and horsetails. Lastly, the Yoredale Sandstones occupy the higher grounds, clothed with

¹ Report on the Botany of the Mountainous portion of Co. Fermanagh to the west of Lough Erne, and the adjoining district of Co. Cavan, *Proc. R.I. Acad.* (2), vol. II., (Science), 531-544. 1882.

shaggy dark heather. They dip southward at low angles, and the long bog-covered dip-slopes alternate with steep scarps, 50 to 100 feet high, which run for long distances east and west, and facing north as they do, provide a congenial habitat for many a rare plant, in surroundings bleak and barren in the extreme. A number of small lakes lie in the east and west hollows under these scarps, and other lakes again along the fringe of the limestone on the lower grounds.

The area which proved the most interesting was the high moorland lying between the Correl Glen depression and Lough Erne. Both in its general and detailed features this district exhibits cuesta structure, to use a term recently referred to in these pages¹—long dip-slopes alternating with steep rocky scarps along lines of jointing.



Diagrammatic Section from Lough Erne to Correl Glen; Upper Carboniferous Limestone, capped by Yoredale Sandstone. Length of section, 3 miles; height, 1,100 feet. Direction, north to south (left to right of sketch).

On my first day (July 3) I walked across the hills in pouring rain to Correl Glen, now familiar by name to Irish botanists as the habitat of *Pyrola secunda* and *Trichomanes radicans*. The scrubby Birch woods were so drenching that I shirked them, and turned up the valley which runs south-west from Carrick Lake, where some good plants were obtained. Thence to Loughs Fadd and Monawilkin; by the former I first met *Pyrola media*, and also *Sesleria* growing on sandstone, of which more anon; the latter added *Rubus botryeros*, apparently a rare bramble, and not hitherto recorded from Ireland. Then over Carrick Hill, where *Euphrasia Salisburgensis*, not previously known in Ulster, was plentiful on the limestone rocks; *Juniperus nana*, on the top of the hill, was a new

¹ *Supra*, p. 145.

county find. I worked round the east end of Carrick Lake, and, the woods having now dried, again to Correl Glen. Picking up last year's bearings¹, I examined the higher half of the wooded sandstone escarpment, left unworked last year, but to my surprise, *P. secunda* did not turn up here; it appears confined to the lower and more shady half.

Next day it poured without intercession. I tramped to Knockmore, and floundered round the base of the huge cliff-wall, through drenching grass and bushes, without a single new plant to reward me. On the precipice above, great dead Yews thrust out gaunt branches, or showed gnarled grey trunks twisting among the grey rocks. Only at the east end of the cliff does this tree now grow in any quantity. Climbing to the summit of the cliff here, *Dryas octopetala* was welcome. Mr. Stewart recorded it from one spot near the western end of the cliff-range; it proved to be very abundant all over the top of the mountain—indeed, I have not seen it in such quantity except in Clare. Another rare plant which was plentiful here was *Euphrasia Salisburgensis*. Some cliffs and limestone pavements south of Knockmore were visited, and then I tramped homeward in the rain.

On July 5 I took the lake-shore road westward to Poulaphuca. This name is applied to the whole range of high cliffs, several miles in length, which overlook Lough Erne. The place is also called Barr of Whealt (pronounce Whee-alt), a name presumably meaning "top of the wooded escarpment," which is certainly descriptive. "Barr" (summit) is a very frequent ingredient in place-names in this area. Ascending to the cliff-base north-east of the point marked 1,030 feet on the one-inch map, I found at once an interesting plant and an interesting animal. The plant was *Dryas octopetala*, recorded from Poulaphuca by Wade exactly 100 years ago. The animal was *Helix arbustorum*, which occurred plentifully on wet slopes covered with grass and *Equisetum maximum*—no nettles. As far as I went along the cliff-base, for a distance of over a mile, this snail was common, especially so when nettles, its favourite habitat, began to be abundant. On the cliffs Hawkweeds were present in large quantity, but small variety, the only form

¹ See *I.N.*, xii., 246. 1903.

represented in addition to the (in this district) ubiquitous *H. anglicum* being a *murorum* form, on which Mr. Linton has not yet definitely pronounced. With them *Euphrasia Salisburgensis* was again found. At the western end of the eastern cliff-range I ascended, and went along the top of the western range, accompanied by a pair of Peregrines, which swooped around me and screamed incessantly. Here *Epilobium angustifolium* represented a nice addition to the county flora, and I was interested to see twice *Saxifraga aizoides*, already found on the low ground below these cliffs by Messrs. Abraham and M'Cullagh. A quarter of a mile back from the edge of the cliff ran one of the curious straight low sandstone escarpments which are so characteristic of this district. I left the cliff top at a point where a single willow grows conspicuously on the extreme edge, crossed the bog, examined a bit of the scarp where a waterfall descends overhung by a willow; found nothing, and had turned away when my eye caught conspicuous splashes of yellow among the rank heather further along, that could belong to only one plant. It was *Meconopsis cambrica*, growing in grand clumps three feet high, and proved only the prelude to further discoveries, for among the heather grew *Equisetum umbrosum*, a Horsetail in Ireland known only from Antrim and Donegal, and indeed not seen in the latter county, despite all Mr. Hart's work, since its original finding by Dr. Dickie some half century ago. Higher up on the low scarp *Pyrola secunda* grew. It was here in abundance and in beautiful bloom, and flourished not only on the scarp, but had invaded the heather above, and grew among it in profusion, with the inseparable *Vaccinium Vitis-Idea*, along a band ten to twenty yards in width, where the drainage was good. On the sandstone rocks, too, *Asplenium viride* was plentiful. This fern had but one previous Fermanagh record. Mr. Plunkett many years ago fell into a swallow-hole on the mountain above Florence-court, and was recompensed for a severe concussion and the loss of a bag of fossils by finding himself surrounded with the delicate foliage of this delightful fern. The fauna here, too, had a northern aspect, for I saw three specimens of the handsome *Carabus glabratus*, a very local mountain beetle.

Next Glencreawan Lake and Meenameen Lake were visited. They are very bare and wind-swept, and the aquatic flora is reduced to a minimum; but one interesting plant grew plenti-

fully on their shores—*Ranunculus scoticus*, which in Ireland hitherto had been found only by one lake in Achill Island by its describer, Rev. E. S. Marshall. It proved to be frequent round the high-level lakes of this district. On the sandstone scarp at the east end of Meenameen Lake *Pyrola secunda* was found again, accompanied very sparingly by *P. media*. *Sesleria* was abundant here, as it proved to be on most of the sandstone scarps. The inevitable rain now came down, in the form of driving mist and thick cloud. I steered eastward across the plateau, getting *P. secunda* and *A. viride* again, and came home along the top of the Poulaphuca east cliffs, where *Epilobium angustifolium* grows abundantly.

On July 6 I gave the rain a couple of hours to clear off, but as it refused to comply, made my way to Bunnahone Lake, which yielded two good and unexpected plants—*Eriophorum latifolium* and *Equisetum trachyodon*. Then, at last in sunlight, a line was taken through the hollow which cuts Carrick Hill in two. Here *Eriophorum latifolium* grew again, this time in company with *E. angustifolium*, among which it could easily be picked out by its taller slenderer stems, smaller fruit-heads, and short yellowish leaves. Indeed, so useful was this object-lesson that next morning, driving above Correl Glen, I easily picked it out in a third station at a distance of fifty yards. Doagh Lough yielded some Pondweeds (*P. alpinus*, *P. heterophyllus*, *P. lucens*, &c.), and other plants, and on the cliffs above it, a second station for the Welsh Poppy was found, and the pretty little *Euphrasia Salisburgensis* again. Behind this hill, the Screenagh River flows through a grand glen, with towering cliffs of limestone on either hand. Turning north, I crossed country to Derryvahan. The sandstone scarps here yielded nothing. The wooded glens in the shales contained *Ulmus montana*, undoubtedly native. From Derryvahan eastward several swamps occur near the stream, which yielded a good flora—*Cladium*, *Carex dioica*, *C. limosa*, *Juncus obtusiflorus*, *Utricularia intermedia*, *Vaccinium Oxycoccus*. Then the light failed.

On my last morning—a fine day at last—I took car ten miles to the west end of the Poulaphuca cuesta, and five minutes after dismounting was revelling in *Pyrolas* again—this time on the scarp over Carricknagower Lake, where *P. secunda*, *P. media*, and what interested me more, *P. minor*, new to *Cybele*

district X, grew with *Asplenium viride* and the usual accompaniment. To gather three species of *Pyrola* together in Ireland fell to the lot of Dr. Moore in Derry seventy years ago, but to no botanist before or since till I had the luck to stumble on Carricknagower. As I gathered my spoils here a brood of young Kestrels sat around me and watched the proceedings with interest. The day was spent working right across the high bog land, examining scarps, lakes, and marshes. As to the scarps, *Pyrola secunda*, *P. media*, and *A. viride* occurred several times again. On the highest point of the elevated ground, Shean North (1,135 feet), the windswept scarp yields *P. secunda* in delightful abundance, growing not only among the stunted heather, and in the *Sesleria* patches on the cliff, but even covering bare slopes of orange sand formed by the disintegration of the rock. In the lakes, the only plant of interest was *Lobelia Dortmanna* at Lough Navar, new to Fermanagh; round the margins of several *Ranunculus scoticus* was plentiful. The wet swamps and boggy lake-shores yielded *Drosera anglica*, *Vaccinium Oxycoccus*, *Pinguicula lusitanica*, *Eleocharis multicaulis*, *Scirpus pauciflorus*, *Cladium*, *Carex dioica*, *C. curta*, *C. limosa*, *C. filiformis*. My last glimpse of the mountain flora, as I turned down a streamlet towards Whiterocks, was a mossy boss under a low sandstone scarp, half a mile south of Shean, decked all over with the pretty greenish-white drooping racemes of *Pyrola secunda*.

I had gone to Fermanagh armed with a goodly list of commoner plants still wanted for that county, but only one of the lot, and that one of the least common—namely, *Ophioglossum vulgatum*—was found during the five days, and it grew under thick trees in the bottom of a deep glen! The additions to the Fermanagh flora which this trip yielded are distinctly interesting, and their northern and montane character is very marked.

- | | |
|---|--------------------------------------|
| X. <i>Ranunculus scoticus</i> . | X. <i>Euphrasia Salisburgensis</i> . |
| <i>Meconopsis cambrica</i> . | X. <i>Ulmus montana</i> . |
| <i>Rubus pulcherrimus</i> . | X. <i>Juniperus nana</i> . |
| X. <i>R. longithyriger</i> (<i>var. botryeros</i>). | X. <i>Eriophorum latifolium</i> . |
| X. <i>Sedum Rhodiola</i> . | <i>Carex dioica</i> . |
| X. <i>Epilobium angustifolium</i> . | <i>C. paludosa</i> . |
| <i>Lobelia Dortmanna</i> . | <i>Ophioglossum vulgatum</i> . |
| <i>Pyrola media</i> . | X. <i>Equisetum umbrosum</i> . |
| X. <i>P. minor</i> . | X. <i>E. trachyodon</i> . |

Of these 18, 11 are additions to the flora of *Cybele* district X., and are distinguished by the figure X. prefixed to them.

Many of the more interesting species of this district had only one previous station in the county, and for a number of these several stations were found:—

<i>Ranunculus Auricomus.</i>	<i>Eleocharis multicaulis.</i>
<i>Vaccinium Oxycoccus.</i>	<i>Cladium Mariscus.</i>
<i>Pyrola secunda.</i>	<i>Carex curta.</i>
<i>Myosotis repens.</i>	<i>C. limosa.</i>
<i>Pinguicula lusitanica.</i>	<i>C. levigata.</i>
<i>Utricularia minor.</i>	<i>C. filiformis.</i>
<i>Empetrum nigrum.</i>	<i>Glyceria plicata.</i>
<i>Listera cordata.</i>	<i>Agropyron caninum.</i>
<i>Juncus obtusiflorus</i>	<i>Asplenium viride.</i>
<i>Potamogeton alpinus.</i>	<i>Lastrea Oreopteris.</i>
<i>P heterophyllus.</i>	

The following notes give the new stations observed for rarer species, with miscellaneous observations. I omit stations which have been already published, including a number of those enumerated in Mr Stewart's paper, in which it was a pleasure to me to find the species in question still growing; nor do I quote separate stations for a number of interesting plants which in this district rank as frequent, such as *Arabis hirsuta*, *Geum rivale*, *Parnassia palustris*, *Saxifraga hypnoides* (limestone only), *Empetrum nigrum*, *Osmunda regalis*.

Ranunculus scoticus, E. S. Marshall.—Frequent around the mountain-lakes. Noted at Glencreawan L., Meenameen L., L. Navar, L. Achork, and the lake west of Shean North; doubtless occurs elsewhere.

R. Auricomus, L.—Carrick Hill, and near Church Hill.

Meconopsis cambrica, Vig.—Very fine on sandstone scarp behind the western cliffs of Poulaphuca. Sparingly on limestone cliffs above Doagh Lough.

Arabis hirsuta, Scop.—On a sandstone escarpment at Lough Fadd. Frequent on the limestone.

Vicia sylvatica, L.—On sandstone on shore of Lough Fadd, and on the *Equisetum umbrosum* scarp. On limestone on the east and west cliff-ranges of Poulaphuca.

Rubus pulcherrimus, Neum.—Margin of Bunnahone Lake. My visit was too early for the majority of brambles.

R. longithyriger, Bab., var. **botryeros**, Focke.—Edge of Monawilkin Lake. "A rather small but strongly-armed form. This comes just between a Clonbur (E. Galway) plant of E. S. Marshall's and a Shobdon (Heref.) one of A. Ley's, both of which I have

placed in my *botryeros* packet. In the typical Devon plant the leaflets are larger and mucronate, and the stem less prickly. In panicle I see no difference."—W. M. R. This bramble is hitherto unrecorded for Ireland, either type or variety.

Dryas octopetala, L.—Abundant all over the top of Knockmore. Likewise at the base of the east end of the eastern cliffs of Poulaphuca, where the cliffs are still low.

Potentilla procumbens, Sibth.—Church Hill and Derrygonnelly.

Aichemilla pratensis, Schmidt.—Carrick Lake, and south-west of Largylinny.

A. alpestris, Schmidt.—Knockmore.

Saxifraga aizoides, L.—On the western cliff-range of Poulaphuca.

Sedum Rhodiola, DC.—At one spot near the summit of the Poulaphuca western cliffs.

Drosera anglica, Huds.—Carricknagower Lough, Lough Navar, and S.W. of Lough Achork.

Epilobium angustifolium, L.—Frequent on the Poulaphuca cliffs, especially on the eastern part.

Circæa alpina, L.—Woods on limestone at Carrick and Knockmore. Glen in the shales west of Church Hill.

Callitriche stagnalis, Scop.—Near Carrick Lake and Knockmore.

Hieracium anglicum, Fr.—Abundant on the limestone hills, from Poulaphuca to Knockmore. Also on the sandstone scarps in a number of places, as at Carricknagower and in the Lough Anlaban neighbourhood.

Lobelia Dortmanna, L.—Along the northern shores of Lough Navar.

Vaccinium Oxycoccus, L.—Lough Anlaban, and lakelet east of Derryvahan.

V. Vitis-Idæa, L.—Remarkably abundant on the Poulaphuca cuesta. Always present in profusion with the *Pyrolas*, and serving as a useful indication when searching for them. Forms an almost continuous fringe along the shores of Lough Navar, with abundant fruit.

Pyrola media, Sw.—Six times observed on the sandstone—on shore of Lough Fadd, and on scarps at Carricknagower, east of Meenamen Lough, north of Lough Anlaban, on Shean North, and half a mile south of the last. It grew with *P. secunda* in all these stations except the first, but always more sparingly.

P. minor, L.—On the sandstone scarp over Carricknagower Lough.

P. secunda, L.—In six stations, in addition to the published one in Correl Glen, all being on sandstone scarps facing north—Carricknagower Lough, east end of Meenamen Lough, north of the point marked 1,033 on OS map (abundant), N.E. of Lough Anlaban, Shean North (abundant), and half a mile south of Shean North (abundant).

Myosotis repens, G. Don.—North-east of Drumbad summit.

Mimulus guttatus, DC.—By the river at Derrygonnelly.

Euphrasia Salisburgensis, Funk.—Frequent on limestone rocks—Poulaphuca, Carrick Hill, hill over Doagh Lough, Knockmore, and on the bare limestones south of Knockmore. Mr. Townsend remarks of my specimens, “more like your Leitrim plant than the Galway one.”

E. brevifolia, Burnat and Gremli.—On cliffs south of Doagh Lough.

Pinguicula lusitanica, L.—West end of Lough Navar.

Utricularia minor, L.—Bog south-west of Carrick Lake.

U. intermedia, Hayne.—Bog south-west of Carrick Lake, and lakelet east of Derryvahan, in the same valley.

Ulmus montana, With.—Native in glens in the shales west of Church Hill and west of Lough Fadd.

Populus tremula, L.—Sandstone cliffs at Drumbad, and south-west of Lough Achork.

Juniperus nana, Willd.—Limestone rocks, summit of Carrick Hill and of the hill S.W. of Doagh Lough.

Taxus baccata, L.—On the east and west cliff-ranges of Poulaphuca. Cliffs over Doagh Lough and Screenagh River. Confined to the limestone.

Listera cordata, R. Br.—Abundant on the sandstone escarpments from 400 feet upwards, growing sometimes nine inches high.

Juncus obtusiflorus, Ehrh.—Marshes west of Church Hill and east of Derryvahan.

Luzula vernalis, DC.—Lough Fadd.

Potamogeton alpinus, Balb.—Stream out of Doagh Lough. Seen also in Mr. Stewart's Carrick Lake station.

P. lucens, L.—Spectacle Lough, Doagh Lough, Monawilkin Lough.

P. heterophyllus, Schreb.—Doagh Lough.

Eleocharis multicaulis, Sm.—Lough Navar, and bog south-west of Carrick Lake.

Scirpus pauciflorus, Lightf.—Carrick Lake and Lough Navar.

Eriophorum latifolium, Hoppe.—Abundant by the Sillees River near its exit from Bunnahone Lake. Deep hollow S.E. of the summit of Carrick Hill. Near the road above the head of Correl Glen.

Rhynchospora alba, Vahl.—Bog south-west of Carrick Lake.

Cladum Mariscus, R.Br.—Frequent in the district. Noted at the lakes of Carrick, Bunnahone, Monawilkin, Fadd, Doagh, and Navar, and by a lakelet east of Derryvahan. Seen also on my return towards Enniskillen at Lough Aleen, which fairly adds it to the Erne flora.

Carex dioica, L.—Frequent: noted in six stations.

C. curta, Good.—Lough Anlaban.

C. Hudsonii, Ar. Benn.—By all the lakes on the lower grounds.

C. limosa, L.—Loughs Navar, Anlaban, and Carricknagower, and by lakelets south of Shean North, and east of Derryvahan.

C. lævigata.—Foot of cliff south-west of Lough Achork.

C. filiformis, L.—Frequent. Noted in eight stations, all on the sandstone, and most of them on the high grounds.

- Carex paludosa**, Good.—Spectacle Lake; and in several spots south-east of Bunnahone Lake.
- C. vesicaria**, L.—Carrick Lake; and by the Silles River north of Derrygonnelly.
- Sesleria cærulea**, Arduin.—On sandstone on the shore of Lough Fadd; and often abundant on the sandstone scarps of the Poulaphuca cuesta, as at Lough Achork, Meenameen Lough, and the summit of Shean North. Very abundant on the limestone.
- Glyceria pilcata**, Fr.—East end of Bunnahone Lake.
- Agropyron caninum**, Beauv.—Dry limestone ledges at Carrick Lake, Doagh Lake, and the glen of the Screenagh River.
- Hymenophyllum tunbridgense**, Smith.—Broken scarp at Drumbad.
- H. unilaterale**, Bory.—Frequent on the sandstone scarps.
- Asplenium viride**, Huds.—Frequent on the sandstone scarps of the Poulaphuca cuesta. Noted at Carricknagower, Drumbad, and four stations within a mile of Lough Anlaban, including the summit of Shean North.
- A. Ruta-muraria**, L.—On sandstone scarps at Lough Fadd, and half a mile south of Shean North.
- Aspidium aculeatum**, Sw.—Frequent in the Church Hill district.
- Lastrea Oreopteris**, Presl.—Only seen in two stations on the lower hills west of Church Hill.
- L. æmula**, Brack.—Abundant everywhere off the limestone.
- Ophioglossum vulgatum**, L.—Shady glen west of Lough Fadd.
- Equisetum pratense**, Ehrh.—Sandstone scarp behind the western cliffs of Poulaphuca, very luxuriant.
- E. trachyodon**, Braun.—Around the base of a boulder on the south shore of Bunnahone Lake.
- Chara fragilis**, Desv., var. **delicatula**, Braun.—Lough Navar, Lough Achork, and bog-holes south of Carrick Lake.
- C. aspera**, Willd., var. **subinermis**, Kuetz.—Meenameen Lough, thrown up as a storm fringe at the east end.
- Nitella opaca**, Ag.—Lough Achork, and Correl River close to Carrick Lake.

A point in the above notes to which special attention is directed is the occurrence on the sandstone escarpments, far above any limestone or limestone drift, of plants usually strongly calcicole. *Sesleria*, as noted, is abundant in such situations; and with it occasionally are *Arabis hirsuta* and *Asplenium Ruta-muraria*. These grow mixed with typical calcifuge species, such as *Vaccinium* *Vitis-Idæa*, *V. Myrtillus*, *Calluna*, *Erica*, *Digitalis*, and *Blechnum*.

To Messrs. Arthur Bennett, H. and J. Groves, E. F. Linton, E. S. Marshall, W. Moyle Rogers, and Frederick Townsend, my best thanks are due for assistance with critical plants.

ANOTHER NEST OF VESPA RUFA-AUSTRIACA.

BY D. R. PACK BERESFORD, D.L.

I HAVE to record the finding of another nest of *Vespa austriaca*, though unfortunately the details are of the most meagre description. On August 6th I noticed *austriaca* drones in large numbers on the trees on which I have caught them every year lately, about the same date. On the same trees I also found *V. vulgaris* workers in large numbers, and a very few *V. rufa* workers.

The method I have adopted for finding nests of *V. rufa* is to catch a worker and hold her by one leg to a saucer of honey. In a very few minutes she will, as a rule, feed rapidly, and if then very quietly released will finish her meal, and after some time spent in cleaning up, will fly straight back to the nest. In this way I tracked several into the same bed of nettles, about five yards back in a plantation; and eventually marked one to ground.

A balloon fly-trap placed over the hole and left there till next day produced only three typical *rufa* workers, which were at once released; and as the nest was so weak I determined to leave it for a bit in the hopes of its increasing in strength.

In this, however, I was disappointed, for on trying the fly-trap again about a fortnight later, not a single wasp was caught. I at once dug up the nest, which was a good foot below the surface and in very hard ground under a tree root, and not, as in the former nest, on the surface amongst the grass.

The nest was completely played out, and the outer covering partially rotted away, though the comb was still fairly sound. It contained only one solitary living wasp, and that an *austriaca* drone; but there were also about ten recognisable carcasses of *austriaca* drones, some of which were still in the cells, having failed to hatch out, and one headless and tailless carcase with *rufa* markings on the first segment of the abdomen, probably a worker.

The fabric of the nest and the comb corresponded very closely to the one found in 1902, and described by Mr. Carpenter and myself.¹ There were two layers only of comb, both being

¹ *Irish Naturalist*, vol. xii., p. 22.

about $2\frac{1}{2}$ inches in diameter, the upper consisting entirely of small cells, rather more than 200 in number, and the lower of about 100 larger or queen cells.

Scanty as these details are, they are yet I think worth recording, as affording a further scrap of material for the study of the relationship between these two interesting wasps.

I might also mention that I have this year found five nests of *V. sylvestris*, all being in the ground.

Bagenalstown.

REVIEWS.

BABINGTON'S BRITISH BOTANY.

Manual of British Botany. By the late CHARLES CARDALE BABINGTON. Ninth Edition, enlarged from the author's manuscripts and other sources by Henry and James Groves. 8vo; 52 + 580 pp. London: Gurney & Jackson, 1904. 9s.

Irish botanists will rejoice that at last the long-promised 9th edition of Babington's "Manual of British Botany" has been issued under the editorship of Messrs. H. and J. Groves. The style of the book remains as in the last edition; the substance embodies the notes and alterations left by the author, and (in small type) additions and critical notes by the editors, to bring the work up to date. But it may save misconception to point out that, as regards "up-to-dateness," the indication given of the distribution of species in Ireland cannot altogether be relied on. On a casual inspection, we note the following as not given as occurring in Ireland:—*Calltha radicans*, [*Lepidium Draba*], *Stellaria umbrosa*, *Rubus lindleyanus*, *R. incurvatus*, *R. Sprengelii*, *Galium cruciatum*, *Hypochaeris glabra*, *Hieracium argenteum*, *H. saxifragum*, *H. rivale*, *H. euprepes*, *H. Orarium*, †*Campanula rapunculoides*, *Cuscuta Trifolii*, **Lycium barbarum*, **Linaria purpurea*, *Euphrasia curta*, *E. scottica*, *Lepturus filiformis*, *Nitella flexilis*. On the other hand, the following are accredited to the Irish flora:—*Fumaria muralis*, *Chrysosplenium alterniflorum*, *Silene pratensis*, *Daucus gummifer*, *Campanula latifolia*, *Cynoglossum montanum*, *Chenopodium vulvaria*, *C. hybridum*, *Rumex palustris*, *Juncus compressus*, *Ophioglossum lusitanicum*. Such inaccuracies but slightly impair the great value of the book, as no one would go to a manual of the kind for information relative to the distribution of plants in Ireland; nevertheless, it seems a pity that more care was not given to this detail.

R. LL. P.

BRITISH MOSSES.

The Student's Handbook of British Mosses. By H. N. DIXON, M.A., F.L.S. ; with Illustrations, and Keys to the Genera and Species, by H. G. JAMESON, M.A. Second edition, revised and enlarged. V. T. Sumfield, Eastbourne, 1904. 18s. 6d. net.

It is exactly eight years since this valuable Handbook first appeared, and now we welcome the issue of a new edition. It might have been thought too short an interval, and that there would be some grumbling at having to purchase a new book so soon ; but its appearance is amply justified by the result. Some 600 species and sub-species of Mosses were described in the first edition in 1896. Since then so much activity has been shown in the collection and study of imperfectly-known plants that 30 more have been added in the present one. These are described and figured. Besides this, the whole work has been revised, and much important matter added to the interesting notes on species. There are 60 additional pages, and 6 new plates of illustrations. While the former work will not lose its value for beginners, we advise those who wish to become acquainted with the less known species to purchase the new edition.

Mr. Dixon's book is so well known that it is not necessary to say much about its general features. There is a short, well-illustrated Introduction and glossary of terms. The keys to the genera and species, and Plates 1-60, are from the Rev. H. G. Jameson's "Illustrated Guide to British Mosses."

The illustrations are truthful, and exhibit such parts as are needful for discriminating species, especially when the plants are without fruit. The only drawback is that there is no life-size drawing of the plant, or means of forming an idea of its habit of growth. For this a more elaborate work must be consulted. The additional plates are not so clear or well drawn as the former ones.

There are keys to the species and full descriptions, salient points convenient for separating neighbouring species being printed in italics. These are followed by notes on the species in smaller type, which are of great interest.

The changes in the new edition are chiefly by way of addition. Mr. Dixon's treatment of his subject is, on the whole, conservative, and new species or varieties have not been hastily multiplied. We notice a tendency to group those together which are closely related, and extend the use of sub-species so as to form ultimately what have been called aggregate species, such as *Grimmia apocarpa*. It may be more difficult to use than a regular lineal series, but we gain a better knowledge of the plants from its use. *Dichodontium flavescens*, *Pottia asperula*, and others have been reduced to the rank of sub-species.

Other changes may not meet with universal acceptance. In *Sphagnum* a cautious policy has been pursued, and until the British species have been thoroughly studied and correlated with those of the Continent this seems best. The familiar arrangement is followed, while Warnstorff's principal species and varieties are inserted in their places in this order, and briefly characterised. His arrangement is followed, however, in the *acutifolium* group.

The name *Harpidium* is still retained for the *Drepanocladus* section of *Hypnum*. Renauld's grouping is adopted in this section, and the full descriptions of all the British forms is a useful feature in the new edition. Several important changes occur amongst the smaller genera of *Hypnaceæ*. Following Dr. Braithwaite, *Sematophyllum* is used to include *Hypnum micans* and *Plagiothecium demissum*. *Pleuropus sericeus* is merged with advantage in *Camptothecium*. We are not so sure of the following. *Isothecium* disappears, and *I. myurum* is transferred to *Eurhynchium*, beside *E. myosaroides*. *Lescuræa* is amalgamated with *Pseudoleskea*, and disappears. These changes tend to simplify the classification. Other changes of name, such as *Helicodontium* for *Myrinia*, have become necessary, but these are not numerous.

New features in this edition are the derivation of the names of genera (we wish this could also have been done for the species), and the accentuation of the names in the Index as an aid to pronunciation.

Sphagnum riparium and *Hypnum turgescens* are distinct and beautiful species, and good additions to our List, while the discovery of *Octodicerus julianum* in the Severn has added a new genus.

Two Irish species, *Ditrichum vaginans* and *Hypnum circinale*, are new.

We have not noted any misprints or errors except the following:—*Plœurochate squarrosa* occurs in Westmoreland further north than is stated on p. 223, and the distribution of *Orthothecium rufescens* on p. 437 should be altered, as it grows in Ireland.

The printing and arrangement of the text is most creditable to the publisher, as the volume has been kept from becoming unwieldy. Enough has been said to show that this is a most valuable work—in fact, the ideal of what a Handbook should be, as distinct from a large and complete work such as the "British Moss Flora." We possess no work on flowering plants on exactly the same lines. One which gave descriptions of varieties within reasonable compass would be a great boon. When Dr. Braithwaite completes his *magnum opus*, as we hope he may before the year is out, we shall have no reason to complain of want of helps to the study of this fascinating class of plants.

C. H. WADDELL.

Saintfield, Co. Down.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a West African male Leopard from Major Fairclough, two Golden Carp from Miss E. Little, eight Perch from Head-Constable M'Hugh, two Sparrow-hawks, a Long-eared Owl, and a Barn Owl from Mr. W. W. Despard, two Bull-frogs from Dr. Trumbull, a Parrakeet from Miss A. Hill, a Caspian Tortoise from Dr. O'Donnell, a young Chimpanzee and two Paradoxures from Lieutenant Stanley, a Moustache Monkey, three Austrian Squirrels, and two Malabar Squirrels from Mr. J. W. Lentaigne, six Guinea-pigs from Sir Algernon Coote, three Ground Squirrels from Mr. Pierce Mahony. Three Lion-cubs and two Golden Agoutis have been born in the Gardens. A Sooty Monkey, many Zebra Finches and Red Cardinal-finches, and a pair of Red-faced Love Birds have been purchased.

The young Chimpanzee is in excellent health, and attracts many visitors to the Gardens. On fine days this little ape may be seen out in the grounds, dressed in a costume of bright blue cloth trimmed with yellow bands. Occasionally he drives abroad in the little pony carriage. The young Elephant, "Padmahati," is very intelligent, and performs many amusing tricks. One of the new ones is entitled "Dinner-time." A properly-laid table is brought out, with a bell to ring for the different courses; and it is most amusing to see the superior manner in which, when every crumb is cleared from the plate, the animal takes the plate in its trunk and hands it to the keeper.

All through the summer there have been a number of treats given to the children of various schools and orphanages which are supported by public subscriptions. The Society has as one of its rules, that schools of this kind are admitted free to the Gardens, and the privilege is very much appreciated. On September 20th, for example, the children of the St. Joseph's Orphanage, Tivoli-road, Kingstown, visited the Gardens. It is always a pleasure to see these children enjoy themselves watching the animals.

BELFAST NATURALISTS' FIELD CLUB.

JUNE 11.—Ninety members and friends attended the second excursion of the season to the Boyne Valley, arriving at Drogheda before 10 o'clock. Brakes were taken for the drive to Dowth, New Grange, and Mellifont Abbey, the antiquarian and architectural features of each being described in detail by the President, W. J. FENNELL, M.R.I.A.I. Collections were made in various branches of science; forty-nine species of birds were noted, and the President's prize for the best collection of flowering plants was won by W. J. C. Tomlinson with ninety-one species. On returning to Drogheda tea was served in the White Horse Hotel, and a business meeting was held at which seven new members were elected. Belfast was reached at 9 o'clock.

JULY 2.—The third excursion was held, the place selected being Ballycastle and Fair Head. Although the weather was broken, ninety-

eight members and friends were present. After a close inspection of the ruins of Bun-na-Margie Abbey, which were described by the President, W. J. FENNELL, cars were taken to near Fair Head, and the ascent was made on foot. After lunch, Wm. Gray, M.R.I.A., described the geological features of the district, and the cars were taken to Ballycastle, where the President and Mrs. Fennell entertained the large company to tea. Two new members were elected, and after a vote of thanks to the host and hostess the 6.20 train was taken to Belfast. The best plants found were *Pyrola media*, *Vicia lathyroides*, and *Cystopteris fragilis*. The President and Vice-President had offered prizes for the best collections of plants and shells; the former was awarded to Miss May Porter (117 species), and the latter to George Donaldson (20 species). William Gray obtained a finely fossiliferous slab of Middle Lias rock. This is a verification of Mr. Gray's discovery of fragments of this geological formation in Ireland.

JULY 30.—The fifth excursion (half-day) was to Roughfort and Templepatrick, over sixty members and friends leaving Belfast in brakes at 2.45. On arrival at Roughfort all dismounted to examine the earthen fort and kistvaen, which were described by W. H. PATTERSON, M.R.I.A. Heavy rain here somewhat marred the proceedings, but after tea at Templepatrick the rain ceased and the members were able to explore Castle Upton demesne, thrown open by Capt. Chichester. *Origanum vulgare* was found growing plentifully in the old graveyard within the demesne, and a few plants of *Ceterach officinarum* obtained. Three new members were elected, and at 7.45 the brakes were entered for the drive home.

AUGUST 13.—The sixth excursion was held to Ardglass, twenty-four members and friends attending. On arrival at Ardglass brakes were entered and the party drove to Benderg Bay, where lunch was partaken of under the steep cliffs of conglomerate. The geology of the district proved very interesting. Botanists found *Calystegia Soldanella*, *Thalictrum dunense*, *Malva rotundifolia*, *Caucalis nodosa*, and *Crithmum maritimum*. Thirty-seven species of birds were noted. On returning to Ardglass tea was served in the Castle Hotel, and one new member elected. The President's prize for the best collection of plants was won by Miss Kidd with 102 species. The Vice-President's prize for the best collection of shells was won by George Donaldson with 45 species. The members returned by the 6.35 train.

SEPTEMBER 3.—The last excursion of the season (half-day) brought fifty members and friends to the 2 o'clock train for Bangor, where brakes were taken on arrival for Helen's Tower. The party were received by the Dowager Marchioness of Dufferin and Ava, who wished the members a pleasant afternoon. After inspecting the tower and admiring the beautiful view from the summit, the members separated to indulge in their various pursuits, some visiting Conlig lead mines and obtaining specimens of minerals. At 5.45 the return drive was commenced, and Bangor was reached in an hour. After tea, the President announced that the excursions for the season were now over, and that the average attendance on the seven which had been held was seventy-five. After a vote of thanks to Lady Dufferin and the election of four new members, the party returned to Belfast by the 7.45 train.

NOTES.

ZOOLOGY.

Ornithology at the Field Club Conference.

On reading in the *Irish Naturalist* of September the very interesting account of the Field Club Conference in Sligo, and of the very successful collecting expeditions round the districts, I was rather surprised at missing from the list of birds met with, several species that have come under my notice and that of my friends when visiting the localities. Crossbills and Siskins were not noticed in their haunts on the fine old fir-trees of Hazelwood near the shore of Lough Gill, and although Common Terns are mentioned as being plentiful on that lake, no mention is made of their island breeding-haunt. Then the regular evening flight of the Woodcock across the lake between the woods of Hazelwood and Omagh does not appear to have been noticed. In the visit to Rosses Point, the breeding haunt of the Lesser Tern on the sandy flat has escaped observation, as well as that on the bare sand of the arm of Drumcliff Bay next Rosses Point. Visiting the finely-wooded demesne of Lissadill, the Blackcaps breeding near the pleasure ground have also escaped notice; while in the visit to Ardermon and Roughly, the Lesser Terns do not appear to have been seen breeding on the sandy stretch of Brown's Bay; and although mention is made of collectors working the shores from Roughly along Brown's Bay, strange to say, that great breeding haunt of the Arctic Tern on Ardbolan Island (a few hundred yards from the shore) quite escaped observation.

The three great breeding grounds of the Arctic Terns on the north-west coast are those on Bartragh Island, Killala Bay, where it is estimated that a thousand pairs, in company with Lesser Terns, breed, and that already mentioned, Ardbolan Island, five hundred pairs; and the greatest of all, Roanish Island, off the Donegal coast, where it is computed they breed in thousands.

ROBERT WARREN.

Moyview, Ballina.

We think Mr. Warren's criticism a little unreasonable. Our object was to give a brief list of the birds *we actually saw* during hurried visits to each locality on the programme, and this we did. Considering that we were accompanied by over sixty people, and therefore were debarred from that quiet observation which is a *sine qua non* in ornithology, and that the weather conditions then prevailing were (to us) so unfavourable, our list is not a poor one.

ROBERT PATTERSON.

N. H. FOSTER.

Belfast.

Mayo Ornithology.

To the August number of the *Zoologist*, Mr. Robert Warren contributes a paper entitled "Ornithological Notes from Killala Bay and the Moy Estuary." In the same number he draws attention to a recent flagrant attempted breach of the Wild Birds' Protection Act, which we are glad to know the Dublin Society for the Protection of Birds promptly check-mated.

Time Occupied by Birds in Building and Laying,

That the indiscriminate robbing of birds' nests cannot be too strongly condemned is a statement that will be endorsed by all ornithologists; though, for the purposes of scientific investigation, it may sometimes be found necessary to abstract the results of the birds' labour. With a view to ascertain the time spent by some of our birds in building a nest and laying the quota of eggs, it was necessary to remove the nest and watch closely till the same birds had repeated their operations; and for the instruction of your readers, I append details of my investigations in this respect. It may be asked, how could I be certain that these nests belonged to the same pair of birds?—and to this my reply is that, with the exception of those birds which breed in colonies, only one pair of birds of a species takes possession, for the season, of an area in which to rear their broods, and from this they do not depart during the season; while if their first nest be disturbed, another is constructed in the vicinity.

(a.) A meadow, about an acre in extent, contained one pair of Water Rails, whose nest with eight eggs was taken on 3rd May; a second nest was built and eight eggs laid by 19th May, which was also taken; and on 31st May a third nest was built and seven eggs laid therein; that is two nests built and fifteen eggs laid in a period of twenty-eight days.

(b.) A nest containing nine eggs of Water Rail was taken on 9th May: by 6th June a brood was hatched in a second nest in same meadow; *i.e.*, nest built, eggs laid, and young hatched in twenty-eight days.

(c.) In a small meadow a Snipe had reared its brood about the middle of May, and by the 23rd of that month had constructed a second nest and laid four eggs, which were removed. A third nest was built and two eggs laid on 3rd June, but, being disturbed, this nest was forsaken; and a fourth nest built, which, on 15th June, contained four eggs; that is, nest built and four eggs laid in twelve days.

(d.) A finished nest of Reed Bunting was found on 20th May, but was not occupied, and the birds constructed a fresh nest. This nest, on 4th June, contained three eggs of the builder and a Cuckoo's egg. On examination these were found to be about three days incubated, from which we may infer that the Reed Bunting will build a nest and lay its clutch in about eleven days.

JOHN COTTNEY.

Hillsborough, Co. Down.

Curious Nesting Site of Starlings.

We have a number of Starlings (*Sturnus vulgaris*) nesting with us every year. As far as I have noted, up to this season they always chose the holes at the corners of the eaves to make their nests, which, according to Mr. Dresser in his "Palæarctic Birds" is a usual place, along with hollow trees, holes in walls, chimneys, clefts of rocks, or holes in the ground. But this year we omitted to cut the ivy on the house in the spring, and in consequence it grew very thickly; last summer I noticed a Starling bringing food into a clump above one of the windows but could not reach this nest. A week or two later another nest was discovered in a more accessible part of the wall, containing four fully fledged young birds. It was built on the ivy branches close to the wall, being composed of hay and a few leaves; it was not deep like that of a Thrush or Blackbird, and I should say measured about 10 inches across—it was in fact more of the style of a platform than a nest proper. We may here have the beginning of a nest-building instinct showing itself in a species which has of late years become so numerous with us, that its breeding members must find great difficulty in getting nesting accommodation in holes in walls and hollow trees. That birds adapt themselves to circumstances has been very clearly shown in Mr. Littler's interesting article on the reasoning power of birds (*Zoologist*, 1903, p. 329) where he points out that the Lesser White-backed Magpie (*Gymnorhina hyperleuca*) of Tasmania used to build its nest of sticks, but as there are few trees in the country these soon got scarce; it then took to the wire used by the reaping machine to tie the sheaves, but this machine has been superseded by one which uses cord, and the birds have to make the best shift they can. I am sure many instances of a like nature could be brought to light.

W. H. WORKMAN.

Belfast.

Barrett-Hamilton's "British Mammals."

Messrs. Gurney and Jackson have in preparation a new book on British Mammals by Captain Barrett-Hamilton, who has devoted many years to the practical study of the subject, and to an examination of its voluminous literature. It will to some extent be based on the work of the late Professor Thomas Bell, inasmuch as the popular and readable portions of that classic volume will be retained, but it will also be thoroughly scientific and up-to-date. The work will be illustrated by a series of coloured plates and other illustrations.

Convolvulus Hawk-moth in Co. Antrim.

On September 1 a *Sphinx convolvuli* was caught at Knocknacarry' Co. Antrim.

S. ARTHUR BRENNAN.

Cushendun, Co. Antrim.

Large Emerald Moth and *Convolvulus* Hawk-moth at Londonderry.

In July last my nephew, Mr. S. B. B. Campbell, took a specimen of *Geometra papilionaria* in the woods at Kilderry, Co. Donegal, about 5 miles from Derry. This is the first time the species has been taken in this district, as far as I am aware.

Sphinx convolvuli has turned up again this year. A friend brought me a specimen on 1st September. It is only within the last two or three years that I have known this Hawk-moth to occur in our Derry district.

D. C. CAMPBELL.

Londonderry.

Limerick Beetles.

The *Journal of the Limerick Field Club*, vol. ii., No. 8 (June, 1904), contains a good paper by Stanley W. Kemp, B.A., on the Beetles of the Limerick district. The list, which numbers 270 species, is mainly founded on material collected by the writer and J. N. Halbert on the joint Field Club excursion in June, 1903.

BOTANY.

Additions to the flora of Co. Limerick.

During the past season I collected the following plants, which do not appear to have been previously recorded for Co. Limerick :—

† *Lychnis Githago*, Scop.—In a field by the Dock-road; also in the Carey's-road quarry, Limerick.

Galium boreale, L.—Sparingly on rocks in the Shannon, about one mile below Castleconnell.

* *Matricaria occidentalis*, Greene.—This plant which, as pointed out by Mr. Colgan (*I.N.*, xiii., 57), appears to be quite a distinct species, occurs in some plenty with *M. discoidea* and other aliens in the Carey's-road quarry.

Teucrium Scordium, L.—One patch, which is quite submerged after heavy rain, by the Shannon, opposite Doonass. It gave me much pleasure to find this, as, though recorded from near Limerick by K'Eogh in 1735, it had apparently not since been seen in the county.

Eleocharis acicularis, R. Br.—Abundant along the canal at Limerick.

Carex xanthocarpa, Degl. (= *C. flava* × *fulva*).—By the Shannon near Castleconnell.

Festuca loliacea, Huds. (= *F. elatior* × *Lolium perenne*).—Bank of the Shannon about one mile east of Limerick; also near Plassy.

R. A. PHILLIPS.

Cork.

British Desmids.

The first volume of W. and G. S. West's "Monograph of the British Desmidiaceæ" has just been issued by the Ray Society, and will prove invaluable to students of the fresh-water flora. The full results are included of the authors' researches in Ireland, which were mainly carried

out under the auspices of the Royal Irish Academy. The bulk of the Irish localities are derived from this source, the balance having been furnished by that brilliant Irish microscopist, William Archer, F.R.S., whose contributions to phycology the authors acknowledge in the following words:—"From 1858 to 1885 a large series of notes and short papers by W. Archer appeared in the 'Proceedings of the Dublin Microscopical Society,' and the 'Quarterly Journal of Microscopical Science,' and in 1861 the same writer contributed the article on the Desmidiaceæ for Pritchard's 'Infusoria.' These are unquestionably among the most valuable contributions to the literature of British Desmids, and clearly prove that Archer was second to none in his detailed acquaintance and clear in sight into the structure and habits of these plants."

GEOLOGY.

Crocodilian remains from Colin Glen, Belfast.

When geologizing in Colin Glen in June last, I was fortunate enough to secure a fossil from the Upper Greensand which has been identified by Dr. A. Smith Woodward of the British Museum as "a slightly abraded crocodilean scute, probably of *Goniopholis* or a related genus." I believe this is the first record of crocodile remains from the Irish Cretaceous rocks. The scute is oblong in shape, and measures 3 inches by 2 inches, and is about $\frac{1}{4}$ -inch thick in the centre, thinning slightly towards the edges. Its upper surface is fitted with rounded depressions about $\frac{1}{2}$ -inch in diameter, placed so close together that their edges form hexagonal figures. The genus *Goniopholis* and its near allies are characteristic of the Purbeck and Wealden strata, occurring also in the Greensand.

WM. CHRISTY.

Belfast.

Coast erosion in North Antrim.

During a walk along the coast from Whitepark Bay to Ballycastle this month (September) A. W. Stelfox and I visited Kenbane, that little headland of indurated Chalk that projects so boldly into the sea from under the more mural precipices of basalt. This northern escarpment of the Antrim basaltic plateau fringes the coast for miles west of Ballycastle, disconnected from the higher cliffs of the Giant's Causeway area by the broad sweep of Whitepark Bay. East of Kenbane the basaltic cliffs are very bold, rising for miles mainly sheer out of the sea, and at a point about a quarter of a mile from the head we noticed that there had been a very heavy rock fall—a section right the whole way from the water's edge to summit of cliff having collapsed into the sea, leaving a new talus right along the base. This fall has taken place at or very close to the little cave in which the Causeway guides quarried so many of the needle-spar and other specimens they sell to tourists. It might therefore be worth the attention of geologists.

R. WELCH,

Belfast.

ON THE VITALITY OF SEEDS BURIED IN THE SOIL.

BY J. ADAMS, M.A.

THERE seems to be a great dearth of authentic observations on the time during which seeds can retain their vitality, and the following instances which came under my notice this year are, therefore, deserving of being placed on record.

As the result of drainage operations in a pasture field at Antrim a considerable amount of loose soil was thrown up, and on this the following weeds made their appearance :—Knotgrass, Black Bindweed, Goosefoot, Charlock, Fool's Parsley, Scarlet Pimpernel, Sow-thistle, Groundsel. This field has been under my observation for the last ten years, and has been all that time grazed as pasture. I am informed by a man who used to work on this farm that it is about twenty years since it was last cultivated, and this, I believe to be a correct estimate.

It will be observed that all in the above list are annual weeds of cultivated ground, and as they have never been observed by me in the pasture during the last ten years, the obvious inference is that the seeds must have lain dormant in the ground from the time when it was last broken up—that is, for about twenty years.

Another field a short distance off was this year cropped with oats. The following weeds appeared in the crop :—Knotgrass, Persicaria, Black Bindweed, Orache, Sun Spurge, Charlock, Winter Cress, *Geranium dissectum*, *Viola tricolor*, *Alchemilla arvensis*, Fool's Parsley, Hemp-nettle, Purple Dead-nettle, *Stachys palustris* (one year old), Figwort (one year old), Scarlet Pimpernel, Field Scorpion-grass, Nipplewort, Groundsel, Sow-thistle. In addition to this list of annual growths, there were also present in the field Ragwort, Cat's-ear, Ox-eye Daisy, Self-heal, Docks, Knapweed, and many others of the usual weeds of pastures.

This field has been pastured for the last nine years, as I have observed it for that time, but I have been unable to determine how long it is since it was last ploughed up. Of the list of annual growths the only one likely to have been sown with the oats is Black Bindweed, as this is sometimes found as an impurity, but it occurred as a weed in the first field re-

ferred to, where no oat crop was raised. So in this case also there appears no doubt whatever but the weed seeds lay in the soil since the field was last cultivated.

Some observations bearing on the effect of severe frost on seeds buried in the ground are worth recording. In the winter of 1901-2 a number of weed and other seeds were put into a shallow box containing about seven inches of soil. The soil was saturated with water and put into an open place, where it was left from 23rd November, 1901, to 7th August, 1902. During the winter severe frosts occurred on fifteen nights altogether. The following seeds germinated:—Horse Chestnut, Radish, Wallflower, *Dianthus barbatus*, Curled Dock, Knot-grass, Fumitory, Common Nettle, Orache, White Campion, Chickweed, *Geranium dissectum*, Goutweed, *Angelica sylvestris*, *Trifolium minus*, Goosegrass, Purple Dead-nettle, Teasel, *Veronica arvensis*, Greater Plantain, Groundsel, Annual Meadow Grass, *Iris Pseudacorus*. On the 23rd December, 1901, after four nights' continuous hard frost, so that there was ice sufficiently strong for skating on, I examined the bare soil of the garden (at Antrim) in an exposed place, and found that the frost had penetrated to a depth of $4\frac{1}{4}$ inches. In a grass field in an exposed part, where the herbage had been cropped close, the frost had penetrated to a depth of $2\frac{3}{4}$ inches. In neither case was there any snow on the surface of the ground.

As seeds when buried in the ground are doubtless saturated with water, it would seem fair to assume that most of those in the top three inches of soil are frozen without being injured. And yet the case is not by any means proved. It is well known that salt water requires a lower temperature to freeze it than fresh water, owing to the amount of salts contained in solution. The protoplasm in the cells of the seed contains a large number of organic and inorganic substances, and whether the temperatures reached in this country are low enough to freeze it remains an open question.

It remains somewhat of a puzzle why the seeds buried in the soil lie so long dormant without attempting to germinate. Three conditions are necessary for the germination of seeds—(1) water, (2) a certain degree of temperature, (3) a supply of air, or, speaking more strictly, of oxygen. There is no doubt but the first condition is fulfilled. The second condition is also complied with—at least in summer. So that it

would seem that it must be want of air that keeps the seeds from germinating. On the other hand, the roots of the herbage descend to as great a depth as that at which the seeds are buried, and yet they require oxygen for their proper respiration. But as very little is known on the respiration of roots, it would be useless to base a comparison on that. Another possible reason why the seeds lie dormant is that, owing to the pressure of the superincumbent earth, the embryo is unable to force its way through the seed coat. When the ground is broken up some of the seeds are brought up nearer the surface, where the pressure is less and there is a better supply of air, and, if they have not been buried too long, they germinate.

In the case of some seeds, at least, it seems that a supply of moisture tends to prolong their vitality. I have repeatedly saved the seed of Yellow Rattle, kept it dry the following winter, and tried to germinate it in spring, but without result, as it had lost its vitality. On the other hand, the seeds which have fallen into the ground produce a plentiful supply of plants in the following spring.

Possibly there may be some readers of the *Irish Naturalist* acquainted with old pastures of which the age is known for certain. If so, it would be interesting to have a few sods removed here and there in order to see what kind of annuals will turn up.

Royal College of Science, Dublin.

ICHNEUMONIDÆ AND BRACONIDÆ FROM THE NORTH OF IRELAND.

BY REV. W. F. JOHNSON, M.A.

I HAVE picked up from time to time a few of the parasitic Hymenoptera. The publication of Mr. Morley's work on the British Ichneumons caused me to look up my notes, and some unnamed specimens that I had in one of my store-boxes. I find I have a list, which, though small, may be of some interest to readers of the *Irish Naturalist*. I am indebted to Mr. J. B. Bridgman and Mr. Claude Morley for kind assistance in determining the species.

ICHNEUMONIDÆ.

ICHNEUMONINÆ.

Cratichneumon fabricator, F.—Acton Glebe; a male.

Ichneumon extensorius, L.—Scotstown, Co. Monaghan, in moss; and Armagh; females.

I. gradarius, Wesm.—Scotstown, Co. Monaghan, in moss. Mr. Morley informs me that this is the second British-captured specimen of this species, *vide* "British Ichneumons," p. 135.

I. confusorius, Grav.—Armagh.

I. tempestivus, Holmgr.—Armagh.

Amblyteles palliatorius, Grav.—Acton Glebe.

A. quadri-punctorius, Müll.—Acton Glebe: variety with black abdomen.

A. armatorius, Forst.—Armagh.

Platylabus rufus, Wesm.—Acton Glebe.

Phæogenes planifrons, Wesm.—Scotstown in moss.

Colpognathus celerator, Grav.—Armagh.

Alomyia debellator, F.—Acton Glebe.

CRYPTINÆ.

Phygadeuon profligator, F.—Armagh.

Hemiteles fulvipes, Gr.—Armagh.

H. castaneus, Tasch.—Armagh.

Hemimachus rufocinctus, Grav.—Armagh.

H. fasciatus, F.—Armagh.

OPHIONINÆ.

Ophion obscurum, F.—Armagh.

O. luteum, L.—Armagh; Acton Glebe; it very often flies into the house at night, attracted by light.

Anomalon ? cerinops, Grav.—Armagh.

Banchus pictus, F.—Churchill, Co. Armagh.

TRYPHONINÆ.

Catoglyptus fortipes, Grav.—Armagh.

Mesolelus proscatorius, Grav.—Armagh.

PIMPLINÆ,

Pimpla turionellæ, L.—Armagh; a male.

BRACONIDÆ.

Ganychorus ruficornis, Nees.—Armagh.

Phæocarpa conspurcator, Hal.—Armagh.

Rhizarcha areolaris, Nees.—Armagh.

Acton Glebe Poyntzpass.

FORAMINIFERA IN GLACIAL SANDS.

BY GEO. C. GOUGH, A.R.C.SC. (LOND.), F.G.S.

ADJOINING the Malone golf-links, Belfast, is a considerable section of reddish-brown sands capped by boulder-clay. The sands are at present being rapidly carted away both for use in mould-making for castings, and for filling-in and levelling a new road which is being made close by. They are known as the "Malone Sands," and are found exposed in various parts of Belfast, being of glacial age, and containing fragments of basalt, chalk, and coal. Mr. Lamplugh¹ believes that "they were laid down in an ice-dammed lake during one of the later stages of the Glacial Period."

At the spot under discussion the sands are about 14 or 15 feet in thickness, but vary greatly, sinking in one place to about 6 feet, where a miniature valley has been scooped out and filled with boulder-clay, this being 12 feet thick at this spot, instead of about 6 feet as it is a short distance away.

In the sands are thin irregular streaks both of clay and of a lighter-coloured sand, and it is in this latter that the Foraminifera are found. Although I have examined samples of the sand from other parts of Belfast, and even samples taken from quite close to the places where the Foraminifera were found, yet I have not been able to detect them elsewhere; and the only record of organic remains in these sands appears to be that of Mr. Praeger in his "Estuarine Clays of Alexandra Dock, Belfast,"² wherein he states that Mr. J. Wright found *Polystomella striato-punctata*, *Rotalia beccarii* and two Ostracods in a sample of the red glacial sands of that Dock.

About 12 pounds of the lighter-coloured sands were taken, floated, and the floatings examined, with the result that nineteen species of Foraminifera were found, a list of which is appended. They are all forms typical of a glacial deposit, and no species have been found but what have been discovered by

¹ Geol. Surv. Mem.:—Geology of Belfast, 1904.

² Proc. Belfast Nat. Field Club, Appendix II., vol. ii, 1886.

Mr. Wright in boulder-clay. One valve of an Ostracod, *Cytheridea sorbyana*, Jones, was also found.

It is rather difficult to account for the irregular distribution of Foraminifera in these sands, but it appears to me that from time to time masses of boulder-clay, containing Foraminifera, slipped or were pushed by the ice sheet into Lake Belfast, and were there covered with sand. The fact that the majority of the specimens are worn tends to bear this out. Some of the clay was probably covered unchanged, forming the thin bands of clay; while some of it became mixed with sands, giving rise to the slightly lighter bands of sand in which I have found the Foraminifera.

LIST OF FORAMINIFERA.

- Bullmina elegantissima**, d'Orb.—One specimen.
Bolivina pilcata, d'Orb.—Common.
Cassidulina crassa, d'Orb.—Very common.
Lagena lineata (Will.).—Frequent.
Lagena williamsoni (Alcock).—Frequent.
Lagena squamosa (Montag.).—One specimen.
Lagena marginata, W. & B.—Common.
Lagena orbignyana (Seg.).—One specimen.
Polymorphina lactea (W. & J.).—Rare.
Uvigerina angulosa. Will.—One specimen.
Globigerina bulloides, d'Orb.—Common.
Discorbina obtusa (d'Orb.).—Rare.
Discorbina rosacea (d'Orb.).—Rare.
Truncatulina lobatula (W. & J.).—Common. These are not typical specimens, but apparently young forms.
Rotalla Beccarii (Linné.).—Rare, poor specimens.
Nonionina depressula (W. & J.).—Very common.
Polystomella macella (F. & M.).—One specimen.
Polystomella striato-punctata (F. & M.).—Very common.
Polystomella arctica, P. & J.—Common. These specimens are not typical *P. arctica*, but approach it very closely.

Queen's College, Belfast.

NOTES.

BOTANY.

Further extension of the range of *Glyceria festucæformis*.

Among some critical plants recently re-examined, which were collected by Mr. S. A. Stewart and myself in 1889-90 during our examination of the Mourne Mountain district in Co. Down, I find two fine specimens of this grass, gathered by me on the shore between Kilkeel and Annalong in July, 1890, and labelled "*G. maritima*?" The coast here is stony for many miles, the result of the cutting back of a high bank of glacial detritus. As at the other Irish Sea station for the grass, near Cloghey, it is unfrequented, and its flora unusually free from chances of contamination. The existence of this station extends the range of *G. festucæformis* over thirty miles south-westward along the coast. Besides providing a further proof that the plant is native in Ireland, it furnishes another hint as to a possible much wider extension of range.

R. LLOYD PRAEGER.

Typha angustifolia in Clare.

Last July Mr. W. F. de V. Kane sent me several interesting plants from the neighbourhood of Ennis, notably *Typha angustifolia*, and in reply to enquiries, has forwarded particulars as to their distribution and habitat, with a map. Of *T. angustifolia* he writes:—"There are three lakes in which it is found [Ballybeg Lake, Killone or Newhall Lake, and Edenvale Lake]. The chief locality for the *Typha* is the shore and marshes at the side and end of Ballybeg L., where it is in vast quantities." This is an interesting extension of range, as the plant was not known south of Dublin (where it has been long extinct) till it was found in Kilkenny a few years ago. The seven other counties in which it grows are all in the northern half of Ireland. Mr. Kane's other finds include *Saxifraga hypnoides*, *Cornus sanguinea* (both on limestone rocks), and *Verbena officinalis*, all formerly recorded in Clare only from the north.

R. LLOYD PRAEGER.

Hypopithys multiflora in Ulster.

Mr. N. Carrothers, of Belfast, has added this rare and interesting plant to the flora of the northern Province. On July 15 last he discovered a colony of it in Ely Lodge demesne, on Lower Lough Erne, and kindly forwarded me a specimen. It is previously on record from only seven botanical divisions, namely - Kerry N., Limerick, Galway S.E., Kildare, Dublin, Roscommon, and Sligo. The Kildare and Dublin records are very old, and in need of confirmation.

R. LLOYD PRAEGER.

Dublin.

Lactuca muralis in King's County.

Rev. R. M. Miller has sent me specimens of this rare plant from King's County. He writes, under date July 25, "I found it on a wall, growing locally but plentifully, near Leap Castle, as I was driving home from a country church yesterday." The Wall Lettuce, which is probably not native in Ireland, is previously recorded from seven counties, all in the south-eastern half of Ireland.

R. LLOYD PRAEGER.

Dublin.

An Immigrant Moss.

In the *Journal of Botany* for September Canon Lett describes a new species of *Hypopterygium* (*H. immigrans*) noticed for some years past by Mr. Greenwood Pim on pots in his greenhouse at Monkstown, Co. Dublin. The origin of the plant is unknown; the genus to which it belongs has a tropical distribution.

ZOOLOGY.

Rare Woodlice from Co. Dublin and Co. Down.

While collecting moss and dead leaves in Bushy Park, Dublin, near the house, for me, Mr. Praeger obtained many specimens of *Trichoniscus roseus*, the beautiful rosy-coloured woodlouse. In April last, shortly afterwards, while hunting for land-shells in the fernery and green-houses we found it in profusion, fine brilliantly-coloured specimens rather larger than usual. Next day Mr. Praeger and I, while searching a mossy bank about a mile from the house for minute mollusca, found it again fairly plentiful, but not so large nor so bright in colour as in the green-houses. Since this Mr. Arthur Stelfox and I have obtained it in the garden at Oakleigh, Belfast. It is abundant under leaves of Rhubarb. A search in the greenhouses was without result so far as *Trichoniscus* was concerned, but we found plenty of *Porcellio dilatatus*¹, hitherto only found in two Irish stations, one of them on the north side of Belfast.

A few days later I was at Dickson's nursery, Newtownards, and here *Trichoniscus roseus* is almost everywhere under pots, boxes, and rubbish heaps, near but not in the greenhouses. These, like the Oakleigh specimens and those from the following locality, were both smaller and duller in colour than the fine Bushy Park specimens. With them were a few of the common *T. pusillus*, and the rare *Porcellio dilatatus* again, but not so common as at Oakleigh. Among the latter was one woodlouse I had never seen before. Prof. G. H. Carpenter kindly identified it for me as *Meloponorthus pruinosis*, Brandt². To-day I find *Trichoniscus roseus* again, sparingly under pots resting on fine gravel in the vinery at Craigowen, Craigavad, Co. Down, with *T. pusillus* and two other common species.

¹ *J. Nat.*, 1894, Pl. 2, fig. 8.

² *Id.* Pl. 2, fig. 12.

It certainly seems to be pretty well distributed both in Belfast and Dublin, whatever may be the case elsewhere in Ireland. Dr. Scharff's Plate referred to is very handy for identifying specimens collected. He has kindly verified some of above for me.

R. WELCH.

Belfast.

Notes on Coleoptera.

Last year I found a number of *Choleva* among potatoes which were stored in an outhouse. Mr. G. C. Champion very kindly examined these specimens for me, and found that the bulk were *C. fusca*, Panz., with a few *C. nigrita*, Er., and one of which he was doubtful, as it was not a good specimen. I took most of these on the walls of the house, but some crawling about among the potatoes and the earth that had been brought in with the tubers. I could not discover whether they were feeding on the potatoes, for I did not see a beetle on a potato, either sound or decayed. This year I have so far only met with one *C. fusca*.

Mr. W. H. Patterson, M.R.I.A., has sent me some more specimens of *Hydroporus dorsalis*, F., from Gilnahirk, along with *Rhantus notatus*, *Agabus rebulosus*, *Ilybius ater*. He took also some very dark *Hydroporus lineatus*.

In the canal near Scarva I took *Hyphidrus ovatus* and *Agabus unguicularis*, and in my own fields *Bembidium bruxellense*. During a brief visit to Bray, Mrs. Johnson took *Rhagonycha pallida*, *Malthunis fasciatus*, *Lochmæa suturalis*, and *Ceuthorrhynchus ericæ* on Bray Head; while a few moments' sweeping while driving through the Dargle yielded *Strangalia armata* and *Chrysomela Banksii*. The season has been very disappointing, and insects very scarce. I took a day at Lough Neagh, but got nothing worth having, almost the only beetle in evidence being *Bembidium bipunctatum*, which was very plentiful.

W. F. JOHNSON.

Poyntzpass.

Occurrence of Spotted Crake in Co. Antrim.

I should like to draw your readers' attention to a specimen of this rare visitor, the Spotted Crake (*Porzana maruetta*), shot on the 8th October, 1904, at Silversprings, near Templepatrick, Co. Antrim, by some gentlemen while out Snipe shooting. It is a very pretty little bird, and it has been beautifully mounted by Mr. Sheals, of Corporation-street, Belfast, where I had the pleasure of examining it. Mr. Ussher, in his "Birds of Ireland," says the Spotted Crake is a rare visitor, occurring chiefly in autumn. It has bred in Roscommon and probably in Kerry. From the same source I gather that two other specimens were brought to Mr. Sheals for preservation, one from Cullybackey on the 8th October, 1898, and the other from Seaford, Co. Down, shot 7th November of the same year.

W. H. WORKMAN.

Belfast.

Great Increase of Arctic Terns in Killala Bay.

A very remarkable increase in the numbers of Arctic Terns visiting the bay and estuary has taken place this season, while their change of breeding haunt from the Inch and Ross sands across the channel to the island of Bartragh is no less so. When I visited the breeding haunt four years ago, some ten or twelve pairs of Common, with a few of the Lesser and Arctic Terns bred on the Inch, a low, gravelly island at the entrance of the little channel leading up to the quay of Killala, while the main flock of the Lesser and Arctic as widely scattered over the Ross sands, extending from the Inch nearly up to the Coastguard Station. At the time of my visit I estimated the numbers of the Lesser Terns at fifty to sixty pairs, and the Arctic at a hundred, or a hundred and fifty. A few pairs of both species had crossed over to the end of Bartragh, laying their eggs on the bare sand, while up to that date (except in March, 1895, when two pairs had eggs), no Tern had ever been known to breed on the island.

The increase in the numbers of the Arctic within the four years since my visit in June, 1899, is astonishing, for, on visiting the breeding haunt on the 16th of last July, I found that nearly all the Lesser and Arctic had deserted the old haunt on the Ross sands, crossing the channel over to Bartragh, where at least 800 to 1,000 pairs of Arctic Terns had eggs or young, the breeding-ground extending from the end of the island, fully a quarter of a mile along the outer side, where they laid their eggs in shallow depressions in the bare sand just above high-water mark, but in no instance did I see any trace of a nest-lining. This great flock of birds rising from their eggs and young in vast clouds, looking like a shower of snow, was a most interesting sight, while their shrill cries were almost deafening as I walked along the sand among the eggs and young birds; the latter, although only in the down, running about the sand like chickens, while the stronger ones tried to hide in the bent grass of the sandhills. All the young of both species were in the down, and many nests had eggs and newly-hatched young, while in one nest I saw three eggs of Arctic and one of the Lesser Tern, the owner of the latter being probably driven off by the stronger birds. I was surprised (though so late in the season) at seeing neither fledged, nor half-fledged birds, and the probable cause of no fledged birds being met is, that the first clutches of eggs were destroyed by a storm, the eggs being buried by the loose sands, and by a gale of wind, blown out of the shallow depressions in which they were laid. Scores of eggs are lying scattered about over the sands, and many that I broke showed no signs of being incubated, all appearing fresh. Although I was about the breeding haunt for hours, I never heard the call of a Common Tern, only the shrill cries of the Arctic and Lesser. Now as the Terns have migrated to Bartragh, there is every probability of their numbers increasing, for they are perfectly safe from disturbance of either dogs or boys, which they were always liable to on the Ross sands, and on that end of the island there are no vermin to destroy either eggs or young, and the proprietor, Captain Kirkwood, strictly preserves them.

ROBERT WARREN.

Moy View, Ballina.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a very fine Irish Goat and some Hedgehogs from Mr. W. W. Despard, a Monkey from Mr. F. J. P. Kerr, a Guillemot from Mr. H. St. G. Galway, and a pair of Spanish Newts from Dr. O'Connell.

The Secretary, while recently in England, was able to secure for the Society three Rhesus Monkeys, two young yellow Baboons, one brown Capuchin, one young Drill Monkey, a young African Porcupine, two Indian Fruit Bats, one Pacca from South America, and a large Indian Python Snake, all of which arrived at the Gardens in excellent condition and are now on view.

The new 'Rodent enclosure' with its picturesque network and shrubbery has now been finished and is tenanted by an interesting collection of animals of the Rodent order—such as Coypus, Pacas, and Rabbits. The Hedgehogs, though members of the Insectivora, also find here a home well suited to their habits.

DUBLIN NATURALISTS' FIELD CLUB.

SEPTEMBER 24.—EXCURSION TO LOUGHSHINNY.—Twenty-four members and friends joined this excursion. The 12.30 train was taken to Rush Station. Thence the party proceeded on cars to the pier at Rush Harbour. The scientific conductor, C. A. MATLEY, D.Sc., F.G.S. then assumed charge of the excursion, which had for its object an examination of the geology of the coast between Rush and Skerries; fine exposures of rocks of Carboniferous age occurring between these two points. The thick series of dark slates south of Rush Harbour were first visited, Dr. Matley pointing out the well-developed cleavage. The overlying conglomerates at Rush were then studied, and were good examples of this type of rock usually composed of a limestone matrix, charged with pebbles and blocks of Silurian rocks, of all sizes—from grains of sand to blocks more than 2 feet in diameter. The beds of the conglomerates are mainly calcareous, but of varying character. They are mostly limestones, occurring in thin, thick, or occasionally massive beds. Above them lies an upper series of black shales. The conglomerates near Skerries are remarkable for their coarseness.

Perhaps the most interesting features which the rocks around Loughshinny exhibit to the visitor are the numerous folds and contortions into which the strata have been thrown by earth-movements. Beautiful examples of anticlines, synclines, domes, &c., are to be seen; and in places the beds are inverted. Faults are not numerous, but several were pointed out, as well as examples of the disappearance of the limestones in places by solution.

An inland party under Mr. Praeger collected seeds, the season being specially favourable for this line of research. After taking tea at Loughshinny cottage the excursion returned to Dublin by the 5.57 train from Skerries.

REVIEW.

THE BIRDS OF THE MONTHS.

Birds in their Seasons. By J. A. OWEN. Preface+pp. 145. London: Geo. Routledge & Sons, Ltd, 1904. 2s. 6d. net.

This little book is arranged in a way we cannot approve of: "Birds in Spring," "Birds in Summer," and "Autumn" and "Winter." This seems to us an unsatisfactory way to deal with British Birds, and one apt to confuse the beginner. For instance, the Starling and Swift appear in "Autumn," the House Sparrow in "Winter," and the Great Grey Shrike in "Spring," while the Fire-crested Wren is mentioned in "Summer," although the text says it has been obtained "invariably in winter." From these examples, picked at random, it will be seen that the author's arrangement is misleading to young people beginning to study British Birds, and we should imagine the book is intended for them. The writing in places is loose; no one would think from p. 5 that the Golden-crested Wren is resident with us, whilst any one would think that the Green Sandpiper breeds in Britain from the account given on p. 73. The Martin arrives *after* the Swallow—not before, as stated, and the song described as the Blackbird's on p. 27 is clearly that of the Thrush, as the former does not repeat its notes. Other similar instances of hasty writing could be given. The information about Irish birds is meagre in the extreme, though the interesting note is made of eighteen eggs having been found in a wren's nest in Co. Limerick. While the Arctic Tern is not mentioned at all, nine lines are devoted to the Rock Thrush (in the division "Autumn,") although the only British example was obtained in May, 1843. The plates (which appeared in Adams' "Smaller British Birds," published in 1874) are poor and indeed misleading. For British readers it would be hard to say whether the picture of the Ring Ouzel in a snow-storm at p. 112 is more incongruous than the Redwing and Fieldfare, in a leafy bower at apparently mid-summer, at p. 88!

Altogether the book is disappointing, and while there are many pleasing anecdotes of bird-life, it is not worthy of the reputation of the author. The best portions of the book are those which deal with the personal experiences of the writer, which are interesting and well told.

R. P.

THE FLORA OF ACHILL ISLAND.

BY R. LLOYD PRAEGER.

ALTHOUGH Achill Island has been visited at one time or another by most of our Irish botanists, and by many English botanists also, no serious survey of its flora has ever been undertaken. The limited and stunted character of its sparse vegetation has a deterring influence, and does not offer to repay a laborious scrutiny. Thus we find A. G. More writing to S. A. Stewart in 1883 :—" I have been in Achill, and I can tell you it has hardly a rare plant. I only recollect *Eriocaulon* and *Erica mediterranea*. Also H. C. Hart has been there and found very little."¹ And indeed, were the finding of rare plants the only object of botanical field-work, Achill would have no special claims on the investigator. But on such an remote outpost of the Old World, the occurrence or non-occurrence of *any* plant has an interest for the student of botanical geography ; and it is to the phytogeographer, rather than to the rarity-hunter, that I offer the following sketch of the vegetation of Achill.

Regarding the history of Achill botany, little has to be said. The first explorer who left any account of his impressions seems to have been Edward Newman², who spent three days on the island during a walking tour in 1839. He visited most parts of the island, noted the peculiar flora of Meenawn (see p. 273 below), found *Osmunda* and a few common plants, and also what at the time was taken for *Erica Mackaii*. He wonders at the houses, " which a good deal resemble those of the Esquimaux Indians," and especially praises the extraordinary scenery at Bunnafreva Lough West.

Prof. Babington³ spent three days on Achill in 1840, and explored the greater part of the island, but does not seem to have noted in his journal any plants of interest ; two species, however, *Erodium moschatum* and *Callitriche platycarpa*, eventually made their appearance (*Ann. Mag. N. H.*, vol. vi., 328, 1841 ; and *Cyb. Hib.*, ed. ii.) as found on this trip.

¹ Life and Letters of A. G. More, p. 301.

² Notes on Irish Natural History, especially Ferns. *Mag. of Nat. Hist.*, N.S., vol. iii., pp. 571-574. 1839.

³ Memorials, &c., of C. C. Babington, p. 93. 1897.

A. G. More¹ spent some weeks in Achill in 1872 and 1873, but his attention was apparently directed chiefly to zoology and sport, as but few plants were noted. He found *Potamogeton nitens* and *Eriocaulon septangulare*, and was shown *Erica mediterranea*.

In 1882 H. C. Hart² explored Achill, in connection with his Report to the Royal Irish Academy on the flora of the mountains of Mayo and Galway. One day was considered enough for these desolate hills, and the writer sums up his impressions of Achill in the words:—"The formation is quartzite chiefly, and the flora appeared uninteresting. I searched several likely places for the more remarkable west of Ireland plants; but, with the exception of London Pride and Maiden Hair fern, none were met with." He noted on Slieve More and Croaghaun *Saxifraga stellaris*, *Sedum Rhodiola*, *Salix herbacea*, and *Carex rigida*, and on the latter *Arctostaphylos Uva-ursi* and *Juniperus nana*; also on Slieve More one plant I did not meet with, namely, *Hieracium anglicum*. He listed 34 species altogether.

At Easter, 1898, I spent a week on the island³, but growth had scarcely begun yet, and the flora was still almost in its winter condition. About 120 species were noted, including a few early spring things, such as *Draba verna* and *Saxifraga tridactylites*, not to be seen late in the season; of the few plants which I recorded, there was an error as regards one, *Ranunculus Lenormandi* proving to be only *R. hederaceus*.

Rev. E. S. Marshall⁴, while botanizing in June, 1899 with Mallaranny as head-quarters, penetrated into Achill as far as Sraheens Lough, added *Ranunculus scoticus* to the Irish flora, and noted a couple of Brambles, a *Euphrasia* segregate, *Eriocaulon*, *Carex limosa*, *Atriplex patula*, and *Melampyrum pratense* var. *hians*.

N. Colgan and Rev. C. F. d'Arcy⁵ spent a day on Croaghaun in 1899, but rain and mist rendered botanizing abortive—as

¹ Life and Letters, pp. 239 *et. seq.* 1898; and *Journ. Bot.* vol. xxvii. 118. 1889.

² *Proc. R. I. Acad.* (2), vol. iii. (Science), pp. 710-712. 1883.

³ *Irish Nat.*, vol. vii., 141-2. 1898.

⁴ *Journ. Bot.*, vol. xxxviii., 184-8. 1900.

⁵ *Irish Nat.*, vol. ix., 117-8. 1900.

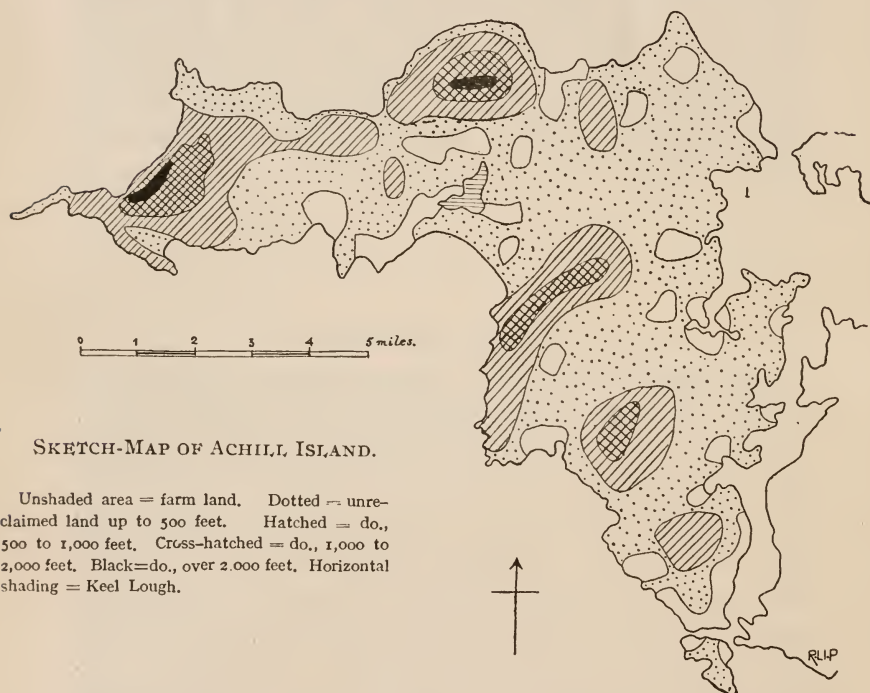
they have a way of doing on Achill--and only a few of the characteristic mountain plants were observed. *Spergularia rupestris*, found at Dooagh, but not at the time recorded, was an addition to the West Mayo flora.

Last July, I devoted ten days to an examination of Achill botany. The weather was favourable, though there was the usual share of rain and mist, especially around Croaghaun. The mountain-cliffs and lakes were tolerably well explored, and observations ranged from Achill Head to Inishbiggle, and from Saddle Head to Camport. The only part of the island that I should have liked to visit, but could not, was the extreme southern corner, including Achillbeg. While my exploration was in no way exhaustive, I think my lists are sufficiently complete to warrant comparison with other areas in the west.

PHYSICAL FEATURES.

The Island of Achill, the largest island on the coast of Ireland, lies close to the mainland in the County of Mayo. Its area is 50, or, including the adjoining islets of Achillbeg and Inishbiggle, 57 square miles. In shape it is roughly a right angled triangle, one of the shorter sides lying north and south opposite the mainland; the other, forming the northern shore of the island, stretching westward into the Atlantic. The intervening channel is narrow, varying in width from a couple of hundred yards to four miles, and in recent years the narrowest point has been bridged. The island is composed of gneiss, mica schist, and quartzite. Quartzite forms the precipices of Croaghaun and Meenawn, gneiss the noble ridge of Slievemore. It is the more enduring nature of the gneiss that has resulted in the hard dripping rocks on Slievemore; the quartzite weathers faster, into shattered crags and barren slopes. The lower grounds have usually a covering of drift, but this, in turn, is over the greater portion covered with peat bog. Blown sand occupies a considerable area behind Trawmore, and occurs also in several spots in the north-east of the island.

The surface is in general hilly, the lower parts undulating, the higher portions forming two considerable mountains. Of these, Slievemore (2,204 feet), is a narrow east-and-west ridge lying on the northern edge of the island; while Croaghaua (2,192 feet) forms a more varied mass, the whole being a long N.E. and S.W. ridge lying on the western extremity of the island. Its seaward face, fully exposed to the Atlantic, forms a glorious precipice of the full height of the mountain—"the most tremendous precipice in Ireland"¹—while on its



SKETCH-MAP OF ACHILL ISLAND.

Unshaded area = farm land. Dotted = unreclaimed land up to 500 feet. Hatched = do., 500 to 1,000 feet. Cross-hatched = do., 1,000 to 2,000 feet. Black = do., over 2,000 feet. Horizontal shading = Keel Lough.

eastern side a huge corry has been excavated, in which lies Lough Acormore, overhung by cliffs nearly a thousand feet in height. In the southern part of the island, the Meenawn range forms a N.E. and S.W. ridge, rising to 1,530 feet, its western slopes carved into gigantic cliffs. In the middle of the island, south of Slievemore, there is a wide depression, which was no doubt filled by the sea in comparatively recent times. A great pebble-beach, backed by low sands, dams back the waters here, and forms the lakes of Keel and

¹ P. W. Joyce, in Philip's "Atlas and Geography of Ireland." 4to.

Sruhillbeg. Several smaller lakes in the north-east are similarly formed. In the west, other lakes at various altitudes occupy deep rock-basins. The coast is in general rocky, and often, as has been stated above, grandly precipitous. In addition to the great strand of Trawmore, or Keel, already referred to, sandy bays occur at Valley in the north-east (where alone dunes have been formed), at Dugort on the north, and at Keem in the west. In the sheltered waters of Achill Sound, peat-bog often forms the shore-line, and also the higher part of the foreshore, and *Fucus* grows on tree-stumps from which the overlying peat has been washed away.

The streams are all short, and liable to heavy floods. There are a number of villages and scattered hamlets on the island, situated near the spots best fitted for cultivation. Out of a total area of 36,976 acres (including Inishbiggle and Achillbeg), only 5,693 acres, or 15 per cent., are at present farmed. It is worthy of note that the area shown as reclaimed on the revised one-inch map of 1899, is only about one-half of the area shown on the map of 1838. The large amount of land which has thus passed out of cultivation has been completely re-occupied by the native flora. The cultivated areas lie mostly along the eastern and southern shores, but also occur as islands in the central bogs. Shelter from westerly gales is a principal desideratum, and also the occurrence of a sandy soil, as about River, or the previous removal for fuel of the intractable upper layers of peat, as at Keel and Dooagh.

CHARACTER OF THE VEGETATION.

The striking features of the vegetation of the island are its treeless and wind-swept character, and the almost unbroken continuity of bog and heath associations. Inside the narrow fringe occupied by the halophile groups, the moorland flora holds undisputed sway, save where, in sheltered places, man has reclaimed some acres from the bog.

The Scaboard.

To begin with the low grounds. The coast vegetation offers three characteristic associations. The most conspicuous of

these is *Plantago* sward, which occurs especially along the tops of low sea-cliffs, ascending to 300 or 400 feet, where it gives way to *Calluna* ground. The description of this association given in my paper¹ on Clare Island last year applies equally to Achill—a very dense close green sward of *Plantago maritima* and *P. Coronopus*, with admixture of such plants as *Anagallis tenella*, *Radiola linoides*, &c., &c., the whole growing in a black springy peaty soil. At the extreme point of Achill Head this association consists of a dense mat of dwarf *P. maritima* and *P. Coronopus* dotted with *Armeria maritima*, *Spergularia rupestris*, *Sagina maritima*, *S. procumbens*, *Cerastium tetrandrum*, *Radiola linoides*, *Festuca ovina*, *Aira præcox*, and *Agrostis vulgaris*. Close by, among stones, the northern *Cochlearia grænlandica* has its home.

The second coast association referred to occupies a great stretch of low flat sandy ground between Keel Lough and the sea. As in the last case, wind and sheep combine to shear the plants to the thinnest possible skin of vegetation. No one species is clearly dominant here. *Agrostis vulgaris* is perhaps generally the most abundant; and a considerable variety of plants occurs:—

<i>Cerastium tetrandrum</i> .	<i>Anagallis tenella</i> .
<i>C. triviale</i> .	<i>Erythræa Centaureum</i> .
<i>Sagina procumbens</i> .	<i>Enphrasia officinalis</i> .
<i>S. nodosa</i> .	<i>Prunella vulgaris</i> .
<i>Lium catharticum</i> .	<i>Thymus Serpyllum</i> .
<i>Radiola linoides</i> .	<i>Plantago lanceolata</i> .
<i>Lotus corniculatus</i> .	<i>P. Coronopus</i> .
<i>Anthyllis Vulneraria</i> .	<i>P. maritima</i> .
<i>Trifolium repens</i> .	<i>Carex arenaria</i> .
<i>T. minus</i> .	<i>C. glauca</i> .
<i>Sedum anglicum</i> .	<i>Agrostis vulgaris</i> .
<i>Parnassia palustris</i> .	<i>Aira præcox</i> .
<i>Hydrocotyle vulgaris</i> .	<i>Koeleria cristata</i> .
<i>Galium verum</i> .	<i>Triodia decumbens</i> .
<i>Bellis perennis</i> .	<i>Selaginella selaginoides</i> .
<i>Taraxacum officinale</i> .	

The only other maritime association which need be mentioned occurs on boggy flats above high tide in the sheltered waters of Achill Sound and its bays, and is fully halophile, dominated by a continuous growth of *Juncus mari-*

¹ *Irish Nat.*, xii., 281.

timus, among which are *Carex extensa*, *C. distans*, *Triglochin maritimum*, *Glyceria maritima*, *Aster Tripolium*, *Salicornia herbacea*, and species of *Spergularia*.

The maritime plants as a whole have their headquarters on the eastern shores of Achill, and only about one-third of them reach the western part of the island.

The Farm-land.

As already mentioned, only 15 per cent. of the surface of the island is reclaimed. The farm-land lies either around the bays, or in sheltered hollows among the hills, and the soil is occasionally sandy, but generally peaty. In the west of the island, hedges are unknown. About Dugort there are a few of Thorn and Fuchsia and more of Gorse, planted on the top of solid banks. In the east these Gorse hedges become more frequent. Owing to the absence of stones on the bogland, walls are likewise uncommon. The divisions between the fields generally consist either of solid banks of boggy earth, or of deep drainage trenches. In the west of the island, rye and potatoes alone are grown, and the cultivated land is a patch-work of grey-green and dark green. About Dugort some good meadowland is found, and further eastward oats and turnips put in an appearance. The actual present state of agriculture on Achill is shown by the following figures, taken from official statistics for the current year, as yet unpublished¹ :—

Reclaimed land, 5,693 acres (or 15 per cent. of the total surface), made up as follows :—

Corn crops,	.	.	656	acres, or 11.8	per cent.
Green crops,	.	.	958	"	2.6 "
Hay,	.	.	716	"	1.7 "
Pasture,	.	.	3,363	"	9.0 "
Unreclaimed land,	.	.	31,283	"	85.0 "

The cereal weeds consist mainly of Chickweed, Spurrey, Persicaria, and Wild Radish, and of three Brassicas (*B. Sinapis*, *B. alba*, *B. campestris*) in about equal quantity. Among the potatoes *Achillea Ptarmica*, *Potentilla Anserina*, *Stachys palustris*, *Artemisia vulgaris*, and occasionally *Bidens tripartita*,

¹ For these figures I am indebted to Mr. E. A. Mortmorency Morris, of the Department of Agriculture.

are abundant. The weed flora decreases in variety westward. Pot-herbs, garden weeds, and such like are very sparingly represented. Tansy and Peppermint were seen about Cashel; Goutweed and Alexanders, at the Colony, Dugort; Tree-Mallow flourishes near the bridge over the Sound. At the same spot *Senecioia didyma* is long established, having been first seen there by H. C. Hart in 1882; and it has recently been joined by that amazing American colonist, *Matricaria discoidea*.

Cottage roofs form the headquarters of the *Atriplices*, and in the same situation *Potentilla Tormentilla* sometimes monopolizes the thatch from ridge to eave; but these plants, with the exception of *Atriplex patula*, grow also far from the cultivated areas.

The Moorland.

The vegetation of the bogland and moorland shows many variants. The wettest swamps support an abundance of *Carex limosa*, *Hypericum elodes*, *Potamogeton polygonifolius*, *Menyanthes trifoliata*, and the three Droseras, forming a close floating felt. The best example of such a swamp occurs at the north end of Keel Lough; here *Carex paniculata* and *C. filiformis* have their only Achill station, and *Nymphaea alba* grows in the felt as a terrestrial plant, with short-stalked aerial leaves. Wherever the bogs are permanently waterlogged, *Rhynchospora alba* and *Drosera intermedia* are characteristic plants. So much for the morassés. About Mweelin Lough the bog is very flat and wet, but solid, with a grassy vegetation consisting of *Schænus*, *Molinia*, *Rhynchospora alba*, and *Narthecium*, among which grow the three Droseras, the two common Eriophorums, *Menyanthes*, *Erica Tetralix*, and a little stunted *Calluna* and *Myrica*. Of the bogs which occupy the large areas of lowland, a very considerable proportion has a surface composed of almost bare peat, thickly studded with little stools of vegetation. The bare floor is thinly colonized by Cotton-grasses. The stools are close together, one to two feet high, and occupied by *Calluna*, *Molinia*, and other common heath plants. How far this humpy bog may be due to the trampling of sheep and cattle, is a point on which I cannot

offer an opinion. On more elevated ground the surface becomes smoother. Where the underlying peat is deep and wet, the Cottongrass-moor type is sometimes well developed; and either *Scirpus caspitosus* or *Narthecium ossifragum* may also be dominant species. On well-drained slopes, or where deep peat is absent, *Calluna* asserts itself absolutely, with an intermingling of *Erica cinerea* and *E. Tetralix*. On the slopes of the Meenawn range peat is absent, and exposure reaches a maximum. Here the vegetation consists of very stunted *Calluna*, with an abundant intermingling of *Arctostaphylos Uva-ursi* and *Juniperus nana*; and *Salix herbacea* puts in an appearance as low down as 1,200 feet. This remarkable association was excellently described by Edward Newman sixty-five years ago. "There is an extent of miles covered with a dense net-work of vegetation, every twig of which leans away from the ocean; this net-work or mat springs beneath the feet with great elasticity: it is principally composed of *Salix herbacea*, *Salix repens*, *Arbutus Uva-ursi*, *Juniperus nanus*, *Calluna vulgaris*, *Erica cinerea*, and a variety of *Carices*." (*Loc. cit*, p. 573).

The summit-flora of the two high peaks of Achill is similar. The ground is similar in each case—a narrow, stony ridge. Slievemore summit (2,204 feet) is occupied by a dry, close felt of *Calluna* and mosses (*Hylocomium squarrosum* and *Antitrichia curtipendula* predominating). The full list is as follows:—

CALLUNA VULGARIS, V.C.	Solidago Virgaurea.
Juncus squarrosus, c.	Vaccinium Myrtillus.
Eriophorum vaginatum, f.	Rumex Acetosa.
E. angustifolium, f.	Empetrum nigrum.
Empetrum nigrum, f.	Luzula maxima.
Cerastium triviale.	Carex rigida.
Potentilla Tormentilla.	Agrostis vulgaris.
Saxifraga umbrosa.	Deschampsia flexuosa.
Galium saxatile.	Festuca ovina, f. vivipara.

Croaghau summit (2,192 feet) exhibits a rocky mossy ridge of stunted *Calluna* with much *Saxifraga umbrosa*, *Vaccinium Myrtillus*, and *Luzula maxima*. The full list is:—

CALLUNA VULGARIS, V.C.	Rumex Acetosa, f.
Saxifraga umbrosa, c.	Empetrum nigrum, f.
Vaccinium Myrtillus, c.	Carex rigida, f.
Luzula maxima, c.	Festuca ovina f. vivipara, f.

Potentilla Tormentilla.
 Galium saxatile.
 Jasione montana.
 Erica cinerea.
 Armeria maritima.
 Euphrasia Foulensis ?

Salix herbacea.
 Juncus squarrosus.
 Carex pilulifera.
 Agrostis vulgaris.
 Deschampsia flexuosa.
 Hymenophyllum unilaterale.

The summit of Meenawn (1,530 feet) is the barest and most wind-shorn place on the whole island. A patchy skin of peaty soil alone covers the disintegrated quartzite. The vegetation consists of a close mat of *Calluna*, with *Empetrum nigrum*, *Vaccinium Myrtillus*, *Erica cinerea*, *Salix herbacea*, and a little *Arctostaphylos* and *Juniperus nana*.

The Lakes.

Lakes and lakelets are numerous on Achill ; some thirty of them are large enough to be marked on the one-inch map, and the largest (Keel Lough) is a mile long and almost equally broad. These pieces of water offer every gradation from tidal lagoons to mountain tarns. Sruhill Lough, in the east, is below spring-tide level, and as the amount of fresh water received is small, the flora is marine, and *Zostera* is the only phanerogam. Two of the little Dooniver Loughs are brackish, with abundance of *Ruppia rostellata* and *Myriophyllum spicatum*, and also *Potamogeton pectinatus*, *Chara fragilis*, *Nitella opaca*. Lough Doo and Lough Nambrack, just beyond the influence of the sea, are in possession of *Potamogeton pectinatus*, which grows in them in enormous quantity, with *Chara aspera* forming a dense mat underneath. Keel Lough is also just above tide level, and separated from the sea by a flat stretch of sand ; yet its flora has a northern and alpine character. *Potamogeton filiformis* is very abundant, especially along the shallow sandy southern shore, where *Chara aspera* forms a thick undergrowth below it. It is accompanied by *P. nitens*, *P. perfoliatus*, and *P. pusillus*. *Lobelia Dortmanna* and *Isoetes lacustris* grow, the former in profusion, at the peaty northern end. Sruhill-beg Lough, lying near, presents a similar but reduced flora, and is choked with *Scirpus lacustris* and *Potamogeton natans*. Lough Gall, which drains into and adjoins Lough Nambrack, is in possession of *Lobelia* and *Eriocaulon*, and in

this respect, and in the complete absence of Pond-weeds and *Characæ*, presents a curious contrast of flora to the adjoining lake, in which *Lobelia* and *Eriocaulon* are absent. These low-level lakes have generally bottoms partly of beautifully clean sand, partly of peat. Sraheens Lough, lying among the bogs at an elevation of about 100 feet, with a stony margin, likewise yields *Lobelia* and *Eriocaulon* in abundance.

To come to the western lakes. They vary in elevation from about 50 to 1,000 feet, and have all a mountain environment, and shores generally composed of angular blocks of rock descending steeply into deep water. Their surface is free of tall reedy vegetation. Here we miss the *Eriocaulon*, Pond-weeds, and *Characæ*, which characterize the eastern lakes. The water-flora is meagre in the extreme. *Littorella* and *Juncus supinus* are universal, and *Sparganium affine*, one of the most wide-spread of Achill hydrophytes, usually occurs in large colonies. *Potamogeton polygonifolius* occasionally grows in deep water, and the margins are fringed with *Ranunculus scoticus*. But hardly another plant is to be seen; *Lobelia*, which was twice observed, and *Isoetes lacustris*, seen in Annagh Lough, complete the list. But I should add that continued storm and high water interfered with exploration of the mountain lakes, and under favourable conditions a larger flora might be discovered. The scenery surrounding some of these western lakes may vie in savage grandeur with anything to be found in the British Isles. Bunnafreva Lough West, at the northern end of Croaghaun, lies on the very edge of a thousand-foot cliff, which drops sheer into the Atlantic, and is itself encircled on two sides by cliffs which rise the better part of another thousand feet. In old days its waters clearly lapped over the edge of the cliff, about 50 feet above its present level, for the old margin can be plainly traced all round the lake; but the present outlet is subterranean, and the waters gush out of the cliff-face several hundred feet below the summit. The passage is evidently small, as a considerable fluctuation of the level of the lake is apparent on its precipitous rocky shores. Annagh Lake, again (Lough Nakeeroge [East] of the Ordnance map), lies on a long low shelf close to the sea, and about fifty feet above it, with a grand precipitous scarp on the one hand and a lovely little sandy bay on the other—a spot of exquisite beauty.

Arboreal Vegetation.

Bushes of Gorse (*Ulex europæus*) and Willow (*Salix cinerea* and *S. aurita*) are the only native arboreal plants which catch the eye of the casual observer. The first forms a fringe low down on the drier slopes, between the farm-land and the heath area. The latter may be seen forming low grey copses occasionally in sheltered nooks, as near the roadside at Cashel. In the western part of the island, three stunted Hollies, a small Birch, and some dwarfed Mountain Ash, all growing a few feet high along the sheltered southern margin of Annagh Lough, are the only trees that I saw. By the same lake there is one plant of *Rosa canina*, the only Rose-bush seen on the island. *P. Aucuparia* grows also occasionally on the western hills as a prostrate plant among the heather, hugging the ground as closely as its neighbour *Juniperus nana*. The extreme paucity and dwarfed growth of the few native trees, as well as of other vegetation, is certainly in part due to grazing animals, for on the tiny islet in Loughannascaddy (the only lake-island on Achill), where sheep cannot penetrate, Mountain Ash forms a low but vigorous thicket, amid tall heather and Royal Fern.

Brambles, which are very rare at the west end of the island, become more frequent eastward, till near the Sound they form luxuriant thickets by the roadsides. *R. pulcherrimus* appears to be the commonest form; and about Dugort the rare *R. cariensis* is plentiful. *R. plicatus* forms extensive colonies on the tops of fences here and there. The extreme paucity of *R. rusticanus* is noticeable. The list of *Rubi* given below certainly does not include more than half of those present on the island. My visit was rather early for these plants, although I remained until August 2; and, furthermore, the extreme exposure so wrecks the flowering shoots as to render identification very difficult; on one or two forms, indeed, I could find no trace of inflorescence whatever.

About Dugort a good many trees have been introduced, and a few plants, such as *Cardamine flexuosa*, take advantage of their shelter. In the east of the island, near the Sound, Glendarary House stands in a sheltered hollow. Conifers and Rhododendrons have been planted here in quantity, and many other trees as well; these form some woods of a fair height.

The principal effect of the shelter thus produced is to increase greatly the number, but not the variety, of certain native plants, notably ferns and brambles. On the hill behind Sraheens Lough, on the outskirts of these woods, the result of the shelter and of the absence of grazing and heather-burning is that several native trees, some of them not found elsewhere in Achill, here put in an appearance and grow to a good size. *Betula pubescens* and *Pyrus Aucuparia* are quite abundant, and with them are *Quercus*, *Ilex*, *Corylus*, and *Alnus*. Near the Sound the introduced trees and bushes include several kinds of Poplar, *Salix pentandra*, *S. fragilis*, *S. Smithiana*, *Prunus Cerasus*, *Rosa rubiginosa*, and others. Patches of *S. viminalis* are grown in many places for basket-making. Generally no attempt whatever is made to plant shelter-trees about the cottages ; but occasionally in the east a few stunted Elders or Poplars may be seen so used.

Alpine Ground.

The summit floras of the highest points of Achill (Slievemore, 2,204 feet ; Croaghau, 2,192), have already been listed when dealing with the moorland flora. On Slievemore, a rocky escarpment facing north runs up the hill almost from base to summit. The upper end of this scarp presents good alpine ground—several hundred feet of hard dripping gneiss. Here *Sedum Rhodiola*, *Saxifraga stellaris*, and *Cystopteris fragilis* grow in great profusion. More locally plentiful is *Oxyria digyna*, not previously recorded from Achill ; but the most interesting plant of Slievemore is *Epilobium angustifolium*, which occupies a grassy ledge at about 1,900 feet, with *Geum rivale*. This is a characteristic plant of Ulster, with outlying stations in the Wicklow and Sligo-Leitrim highlands.

Croaghau presents a grand precipice nearly 2,200 feet high, facing north-west, and plunging right into the Atlantic. The similarity of conditions here to those prevailing at the 1,500-foot cliff on Clare Island, which yields so interesting an alpine flora, led me to have hopes of Croaghau in this respect. But here a disappointment awaits the botanist. The Croaghau scarp yields, as regards highland plants, only *Saxifraga stellaris*, *Sedum Rhodiola*, *Salix herbacea*, and *Carex rigida*. The explanation is to be found, I think, in the nature of the rock.

The quartzite of which the scarp is formed is much jointed, and is breaking down rapidly; instead of hard persistent rock-faces, with water trickling down them, such as alpine slopes, we get shattered crags, with gaping joints which swallow the rains, and eventually lead to the destruction of the rock-masses. A northern savour is given to the Croaghnaun flora by the identity or resemblance of two of its plants to Shetland forms—a remarkable variety of *Hypericum pulchrum*, var. *procumbens* Rostrup, and an Eyebright resembling if not identical with *Euphrasia Fouldensis*; as well as by the occurrence near the base of the mountain of *Cochlearia grænlandica*.

TOTAL FLORA.

The total flora of Achill Island (Phanerogams and Higher Cryptogams), as enumerated below, numbers 416 species and sub-species, the standard list used in this estimate being that of 'Irish Topographical Botany.' Plants reckoned as varieties in that book are dealt with separately. Following the plan adopted in my Clare Island paper, I first list the total flora, with a brief indication of the frequency of each plant (1, 2, 3, once, twice, thrice found; *r* = rare, *l* = local, *f* = frequent, *c* = common, *v* = very), and subsequently refer more fully to the rarer plants. The list is not encumbered and artificially enlarged by introduced plants unless these are now naturalized, *i.e.*, have by reproduction established themselves as *permanent* members of the flora.

Those plants which have been recorded from Achill which I did not meet with (4 in number) are distinguished by being printed in italic type.

Ranunculus aquatilis, <i>r</i> .	Nasturtium officinale, <i>f</i> .	Capsella Bursa-pas-toris, <i>f</i> .
hederaceus, <i>f</i> .		
Flammula, <i>c</i> .	†Barbarea vulgaris, <i>l</i> .	‡Senebiera didyma, <i>l</i> .
scoticus, <i>f</i> .	Cardamine pratensis, <i>f</i> .	Cakile maritima, <i>l</i> .
acris, <i>f</i> .	hirsuta, <i>r</i> .	Raphanus Raphanistrum, <i>f</i> .
repens, <i>c</i> .	flexuosa, <i>l</i> .	
bulbosus, <i>l</i> .	Erophila vulgaris, <i>2</i> .	Viola palustris, <i>c</i> .
Ficaria, <i>l</i> .	Cochlearia officinalis, <i>c</i> .	Riviniiana, <i>c</i> .
Caltha palustris, <i>f</i> .	danica (grænlandica), <i>l</i> .	arvensis, <i>l</i> .
Nuphar luteum, <i>f</i> .		Polygala vulgaris, <i>2</i> .
Nymphæa alba, <i>f</i> .	Brassica campestris, <i>c</i> .	serpyllacea, <i>f</i> .
Fumaria capreolata, <i>l</i> .	Sinapis, <i>c</i> .	Silene maritima, <i>f</i> .
confusa, <i>l</i> .	alba, <i>f</i> .	Lychnis Flos-cuculi, <i>r</i> .

- Cerastium tetrandrum*,
c.
glomeratum, *r.*
triviale, *f.*
Stellaria media, *c.*
graminea, *r.*
uliginosa, *f.*
Arenaria serpylli-
folia, *f.*
peploides, *r.*
Sagax maritima, *f.*
procumbens, *c.*
nodosa, *f.*
Spergula arvensis, *c.*
Spergularia media, *r.*
salina, *r.*
rupestris, *l.f.*
Montia fontana, *v.c.*
Hypericum Androsæ-
mum, *i.*
tetrapterum, *r.*
pulchrum, *f.*
elodes, *f.*
**Lavatera arborea*, *i.*
†Malva sylvestris, *i.*
Radiola linoides, *c.*
Linum catharticum, *c.*
**Geranium pratense*, *i.*
molle, *f.*
†dissectum, *r.*
Robertianum, *2.*
Erodium cicutarium, *c.*
moschatum, *i.*
Oxalis Acetosella, *r.*
Ilex Aquifolium, *2.*
Ulex europæus, *f.*
†Gallii, *i.*
†Cytisus scoparius, *i.*
Trifolium pratense, *f.*
repens, *c.*
dubium, *c.*
Anthyllus Vulneraria, *c.*
Lotus corniculatus, *f.*
uliginosus, *l.*
Vicia Cracca, *f.*
sepium, *2.*
Lathyrus pratensis, *r.*
macrorrhizus, *2.*
Spiræa Ulmaria, *r.*
Rubus Idæus, *i.*
plicatus, *f.*
cariensis, *2.*
rhamnifolius, *i.*
pulcherrimus, *f.*
rusticanus, *2.*
iricus, *2.*
mucronatus, *2.*
denensis, *i.*
Drejeri (Leyanus), *i.*
rosaceus (hystrix), *i.*
Geum rivale, *i.*
Fragaria vesca, *i.*
Potentilla Fragaria-
strum, *i.*
Tormentilla, *c.*
procumbens, *i.*
reptans, *r.*
Anserina, *f.*
palustris, *f.*
Alchemilla arvensis, *r.*
Rosa canina, *i.*
Pyrus Aucuparia, *r.*
Cratægus Oxyacantha,
i.
Saxifraga stellaris, *3.*
umbrosa, *c.*
tridactylites, *2.*
Chrysosplenium oppo-
sitifolium, *i.*
Parnassia palustris, *f.*
Cotyledon Umbilicus,
i.
Sedum Rhodiola, *l.c.*
anglicum, *c.*
acre, *r.*
Drosera rotundifolia, *c.*
anglica, *v.f.*
intermedia, *f.*
Hippuris vulgaris, *r.*
Myriophyllum spi-
catum, *c.*
alterniflorum, *r.*
Callitriche stagnalis, *c.*
Lythrum Salicaria, *v.c.*
Epilobium angusti-
folium, *i.*
parviflorum, *c.*
†montanum, *i.*
Epilobium obscurum, *c.*
palustre, *f.*
Circæa lutetiana, *i.*
Hydrocotyle vulgaris,
v.c.
Eryngium maritimum,
2.
Sanicula europæa, *2.*
†Smyrnium Olusa-
trum, *i.*
Apium nodiflorum, *c.*
inundatum, *i.*
†Ægopodium Poda-
graria, *i.*
Conopodium denu-
datum, *i.*
†Anthriscus sylvestris,
i.
Crithmum maritimum,
2.
Œnanthe crocata, *i.*
Angelica sylvestris, *c.*
Heracleum Sphon-
dylum, *f.*
Daucus Carota, *c.*
Hedera Helix, *r.*
†Sambucus nigra, *r.*
Lonicera Periclyme-
num, *r.*
Galium verum, *f.*
saxatile, *c.*
palustre, *c.*
Aparine, *f.*
Sherardia arvensis, *i.*
Valeriana sambuci-
folia, *r.*
Scabiosa Succisa, *f.*
Solidago Virgaurea, *f.*
Bellis perennis, *c.*
Aster Tripolium, *r.*
Antennaria dioica, *r.*
Gnaphalium uligino-
sum, *f.*
sylvaticum, *i.*
Bidens cernua, *r.*
tripartita, *f.*
Achillæa Millefolium, *f.*
Parnica, *c.*
Anthemis nobilis, *i.*

- Chrysanthemum segetum*, *l.*
Leucanthemum, *f.*
Matricaria inodora, *c.*
 **discoidea*, *l.*
 **Tauacetum vulgare*, *2.*
Artemisia vulgaris, *f.*
Tussilago Farfara, *f.*
Senecio vulgaris, *f.*
sylvaticus, *f.*
Jacobæa, *f.*
aquaticus, *v.c.*
Arctium minus, *l.*
intermedium, *l.*
Cnicus lanceolatus, *f.*
palustris, *r.*
pratensis, *c.*
arvensis, *r.*
Centaurea nigra, *c.*
Lapsana communis, *r.*
Crepis virens, *c.*
Hieracium Pilosella, *2.*
anglicum, *l.*
umbellatum, *l.*
Hypochæris radicata, *c.*
Leontodon autumnalis, *c.*
Taraxacum officinale, *f.*
Sonchus oleraceus, *f.*
asper, *f.*
arvensis, *l.*
Lobelia Dortmanna, *f.*
Jasione montana, *c.*
Campanula rotundifolia, *2.*
Vaccinium Vitis-Idæa, *l.*
Myrtillus, *c.*
Arctostaphylos Uva-ursi, *v.l.*
Calluna vulgaris, *v.c.*
Erica Tetralix, *c.*
cinerea, *c.*
mediterranea, *r.*
Armeria maritima, *c.*
Primula vulgaris, *f.*
Lysimachia nemorum, *2.*
- Glaux maritima*, *f.*
Anagallis arvensis, *r.*
tenella, *v.c.*
Samolus Valerandi, *f.*
Erythræa Centaureum, *f.*
Menyanthes trifoliata, *c.*
 **Symphytum officinale*, *f.*
Myosotis cæspitosa, *c.*
palustris, *r.*
repens, *f.*
arvensis, *f.*
versicolor, *r.*
Calystegia sepium, *2.*
Scrophularia nodosa, *l.*
 **Mimulus guttatus*, *l.*
Digitalis purpurea, *r.*
 †*Veronica agrestis*, *l.*
arvensis, *f.*
serpyllifolia, *r.*
Anagallis, *f.*
Beccabunga, *c.*
Euphrasia officinalis, *v.c.*
Bartsia Odontites, *f.*
Pedicularis palustris, *f.*
sylvatica, *f.*
Rhinanthus Crista-galli, *f.*
Melampyrum pratense, *r.*
Utricularia minor, *r.*
intermedia, *2.*
Pinguicula vulgaris, *f.*
lusitanica, *r.*
 **Mentha piperita*, *l.*
hirsuta, *r.*
arvensis, *f.*
Thymus Serpyllum, *f.*
Prunella vulgaris, *f.*
Stachys palustris, *c.*
Galeopsis Tetrahit, *c.*
Lamium intermedium, *f.*
purpureum, *r.*
hybridum, *r.*
- Teucrium Scorodonia*, *2.*
Ajuga reptans, *l.*
Plantago major, *f.*
lanceolata, *f.*
maritima, *c.*
Coronopus, *c.*
Littorella lacustris, *c.*
Chenopodium album, *c.*
Beta maritima, *2.*
Atriplex patula, *f.*
hastata, *f.*
Babingtonii, *r.*
Salicornia herbacea, *l.*
Suaeda maritima, *2.*
Salsola Kali, *2.*
Polygonum Convolvulus, *f.*
aviculare, *r.*
Raii, *l.*
Hydropiper, *c.*
Persicaria, *c.*
lapathifolium, *f.*
amphibium, *f.*
Oxyria digyna, *l.*
Rumex obtusifolius, *c.*
crispus, *f.*
Acetosa, *c.*
Acetosella, *c.*
Urtica dioica, *f.*
urens, *r.*
Myrica Gale, *c.*
Betula pubescens, *2.*
Alnus glutinosa, *l.*
Corylus Avellana, *l.*
Quercus Robur, *l.*
 **Salix pentandra*, *l.*
cinerea, *f.*
aurita, *f.*
repens, *c.*
herbacea, *3.*
Empetrum nigrum, *v.f.*
Juniperus nana, *r.*
Listera cordata, *2.*
Orchis incarnata, *r.*
maculata, *f.*
Habenaria viridis, *l.*
chloroleuca, *l.*

- Iris Pseud-acorus, c.*
Scilla nutans, l.
Narthecium ossifragum, c.
Juncus bufonius, c.
squarrosus, c.
Gerardi, l.c.
effusus, c.
conglomeratus, r.
maritimus, l.c.
supinus, v.c.
lamprocarpus, f.
acutiflorus, f.
Luzula maxima, c.
canipestris, f.
erecta, f.
Typha latifolia, l.
Sparganium ramosum, r.
simplex, l.
affine, c.
Lemna minor, r.
Triglochin palustre, f.
maritimum, r.
Potamogeton natans, f.
polygonifolius, c.
nitens, 2.
perfoliatus, f.
pusillus, r.
pectinatus, 3.
filiformis, 2.
Ruppia rostellata, 2.
Zostera marina, r.
Eriocaulon septangulare, l.f.
Eleocharis palustris, f.
multicaulis, v.c.
Scirpus pauciflorus l.
cæspitosus, c.
fluitans, f.
Savii, f.
setaceus, f.
lacustris, r.
Eriophorum vaginatum, f.
angustifolium, c.
Rhynchospora alba, v.f.
Schænus nigricans, f.
- Carex pulicaris, f.*
arenaria, f.
paniculata, l.
echinata, c.
ovalis, r.
rigida, r.
vulgaris, c.
glauca, c.
limosa, 2.
pilulifera, f.
præcox, r.
panicea, f.
binervis, f.
distans, l.f.
extensa, l.f.
flava, c.
filiformis, l.
ampullacea, f.
Phalaris arundinacea, l.
Anthoxanthum odoratum, f.
Alopecurus geniculatus, r.
Agrostis alba, f.
vulgaris, c.
Psamma arenaria, l.f.
Aira caryophyllæa, f. ;
præcox, c.
Deschampsia cæspitosa, 2.
flexuosa, f.
Holcus mollis, r.
lanatus, f.
Arrhenatherum, avenaceum, c.
Triodia decumbens, f.
Phragmites, communis, f.
Cynosurus cristatus, f.
Koeleria cristata, 2.
Molinia cærulea, c.
Catabrosa aquatica, r.
Dactylus glomerata, f.
Briza media, l.
Poa annua, f.
pratensis, r.
trivialis, f.
- Glyceria fluitans, f.*
†aquatica, l.
maritima, l.f.
Festuca rottbœllioides, r.
sciuroides, r.
ovina, c.
rubra, r.
Bromus mollis, f.
Lolium perenne, r.
Agropyron repens, f.
juncum, l.f.
Nardus stricta, c.
Hymenophyllum tunbridgeense, r.
unilaterale, f.
Adiantum Capillus-Veneris, l.
Pteris aquilina, f.
Blechnum Spicant, v.c.
Asplenium Adiantum-nigrum, r.
marinum, c.
Trichomanes, r.
Athyrium Filix-femina, v.c.
Scolopendrium vulgare, 2.
Cystopteris fragilis, l.
Lastrea Filix-mas, f.
dilatata, c.
æmula, c.
Polypodium vulgare, r.
Osmunda regalis, c.
Ophioglossum vulgatum, 3.
Equisetum arvense, f.
palustre, r.
limosum, r.
Lycopodium Selago, r.
Selaginella selaginoides, r.
Isoetes lacustris, 2.
Chara fragilis, l.
aspera, 3.
vulgaris, l.
Nitella opaca, 2.

Two plants recorded from Achill are omitted from this list, namely, *Saxifraga pedatifida*, reported by A. W. Bennett¹ to have been sent from Achill by William Andrews, and *Erica Mackaii*, to which I have already referred. These records are not correct.

STATIONS FOR RARER PLANTS, VARIETIES, &c.

The following notes give particulars as to segregates and varieties noted, and the distribution of the rarer plants.

Ranunculus aquatilis, L.—The Batrachian *Ranunculi* are represented by one, or possibly by two species—? *R. heterophyllus* in Keel Lough and Sruhills Lough, and ? *R. trichophyllus* in pools on Keel Strand. My visit was too late for the gathering of satisfactory specimens, so for the present I have put them under the Linnean aggregate.

R. scoticus, Marshall.—Frequent by all the western lakes; specimens from L. Nakeeroge West and Annagh Lake were sent for confirmation to the describer, Rev. E. S. Marshall. Seen also in the east, at the original Irish station (Sraheens Lough), and apparently at Lough Gall ("probably, root-leaves withered."—E. S. M.)

Fumaria capreolata, L.—With *F. confusa* on a sandy bank at Old Dugort.

Cochlearia grœnlandica, L.—A tiny Scurvy-grass in full flower and fruit, which grew with luxuriant *C. officinalis* among boulders on the cliffs close to Achill Head, I took it to be this, and Rev. E. S. Marshall confirms the name. Previously known in Ireland only from the North Donegal.

Polygala vulgaris, L.—On the Croaghaua cliffs only; the same large-flowered form as noted from Clare Island.

Sagina maritima, Don., var. **densa** (Jord.).—Forming dense round tufts near Dooagh.

Spergularia rupestris, Lebel.—Along the southern shore, from Achill Head (where it is extremely dwarf) to Campport.

Radiola linoides, Roth.—Remarkably abundant on Achill, and ranges from the extreme point of Achill Head to Inishbiggle. A very dense leafy form at Dooega Head.

Hypericum pulchrum, L., var. **procumbens**, Rostrup.—A remarkable dwarf variety, with filiform prostrate stems a few inches long, often terminating in only a single flower, was abundant on Croaghaua, from 1,500 feet up. Mr. A. Bennett writes of it:—"Quite towards var. *procumbens*, Rostrup (*i.e.*, Beeby's Shetland plant). Beyond Beeby's specimens, I have seen nothing like yours." Mr. W. H. Beeby writes:—"I think that the *Hypericum pulchrum* should be referred to var. *procumbens*, Rostrup, though it is more robust than the Shetland plant."

¹ *Journ. Bot.*, xxi., 152. 1883.

- Hypericum elodes**, L.—At north end of Keel Lough a submerged form grew up from the bottom of pools three feet deep, reaching the surface, but not flowering.
- ***Geranium pratense**, L.—Abundantly naturalized in fields and on banks near Dugort.
- Erodium moschatum**, L'Hérit.—Dooagh, 1840 (Babington in herb.)—*Cyb. Hib.*, ed. II.
- †**Ulex Gallii**, Planch.—One bush by roadside, $\frac{1}{2}$ mile north of Mweelin, in an old gorse hedge. The occurrence of a single plant of so gregarious a species suggests introduction, but the place has been derelict for many years. Though abundant in West Galway, the species is unrecorded for Mayo.
- †**Cytisus scoparius**, L.—Only seen as a kind of hedge on Inishbiggle.
- Rubus plicatus**, Wh. & N.—Twice gathered near Dugort. Of these plants Mr. Rogers writes:—"Going off from type towards var. *hemistemon*, but distinct from that, I think." Also seen north of Keel, and near Cashel. Recorded by E. S. Marshall from "Achill Island": i.e., near the Sound (*loc. cit.*).
- R. cariensis**, Genev.—Common about Dugort (four gatherings made). Found also near the Sound. A rare bramble, recorded from Wexford only in *I.T.B.*, but lately found in N. Kerry (*supra*, p. 129).
- R. rhamnifolius**, Wh. & N.—Roadside near the Monastery.
- R. pulcherrimus**, Neum.—The commonest bramble on the island. Specimens from Dugort, Slievemore, Monastery, and River were named by Mr. Rogers. E. S. Marshall got it near Achill Sound (*loc. cit.*)
- R. rusticanus**, Merc.—Extremely rare. A few small bushes about Cashel, and one on the margin of Annagh Lake.
- R. iricus**, Rogers.—Gathered at Dugort and at Keel. Mr. Rogers adds a note:—"This was sent me from Dugort last year by Rev. H. H. Slater."
- R. mucronatus**, Blox.—Roadside at Cashel, and margin of Mweelin Lough.
- R. dunensis**, Rogers.—Dugort. "I believe my *R. dunensis*, *J. B.*, 1901, 382; though, as you will see on comparison with my description in *J. B.*, further examination of living bushes is desirable for absolute certainty."—W. M. R. A plant from Annagh Lake is doubtfully referred to the same form. This bramble is hitherto known only from Down and Armagh.
- R. Drejeri**, G. Jensen, sub-sp. **Leyanus**, Rogers.—Near Achill Sound "Must go, I think, to my *R. Leyanus*, from some shadegrown and slightly armed forms of which (from different English counties), it seems not to differ in any essential point."—W. M. R.
- R. rosaceus**, Wh. & N., var. **hystrix** (Wh. & N.).—Keel.
- Potentilla procumbens**, Sibth.—Only seen near Keel Lough. One specimen is referred by Rev. E. S. Marshall (but with some doubt) to *P. procumbens* \times *reptans* (= *P. mixta*, Nolte.)
- Saxifraga stellaris**, L.—Slievemore cliffs, abundant from about 1,700 feet up. More sparingly near Croaghnaun summit, and on rocks over Bunnafreva Lough West at about 1,100 feet.

- Saxifraga umbrosa**, L.—Abundant everywhere, from sea-rocks to mountain-tops.
- S. tridactylites**, L.—Sands at Dugort and Trawmore, with *Erophila vulgaris*, apparently the only habitat of either.
- Sedum Rhodiola**, DC.—Abundant on rocks on the higher parts of Slievemore, and on Croaghaun from sea to summit; also on the sea-cliffs from Keem round to Dugort, descending to within 20 feet of sea-level.
- S. acre**, L.—While *S. anglicum* is abundant everywhere, *S. acre* is confined to sea-sands. I fancy this is the result of its calcicole tendencies.
- Drosera Intermedia**, Hayne.—Very frequent. In deep bog-holes near Sraheens Lough it forms floating patches, some of which drift about.
- Epilobium angustifolium**, L.—On the Slievemore rocks at 1,800 feet.
- Anthemis nobilis**, L.—Plentiful on stream-banks and roadsides about Cashel.
- Senecio Jacobæa**, L., var. **fiosculosus** (Jord.)—About Old Dugort and Valley, with the type.
- Arctium majus**, Bernh.?—In doubtfully naming a Burdock collected near the Sound, *A. majus*, Mr. Bennett writes:—"It is impossible to name some specimens unless seen *in situ*—unless very full material is collected."
- A. minus**, Bernh.—Dooagh, and I believe elsewhere.
- A. Intermedium**, Lange.—Lough Nambrack: possibly frequent. My visit was rather early for Burdocks.
- Hieracium anglicum**, Fr.—Slievemore, 1882: Hart, *loc. cit.*
- H. umbellatum**, L.—In several spots round the margin of Annagh Lough.
- Leontodon autumnalis**, L., var. **simplex**, Duby.—This very small single-headed variety was frequent on sea-rocks, and on cliffs high up on Croaghaun.
- Lobelia Dortmanna**, L.—Frequent, chiefly at very low levels. Lough Gall, Sraheens L., Mweelin L., Black L., north end of Keel L., Bunnafreva L. East, and in a lakelet north of it; Annagh L.
- Vaccinium Vitis-Idæa**, L.—Near summit of Slievemore.
- Arctostaphylos Uva-ursi**, Spreng.—In great abundance on the Meenawn range, from 800 feet up. Elsewhere seen only on heaths below Lough Acorrymore.
- Erica mediterranea**, L.—Rare, and chiefly in the east. By the stream behind Valley Strand, to which place I was directed by Mr. John Sheridan in 1898. Sparingly from Lough Doo to Bull's Mouth, which, Mr. Sheridan since informs me, is the other station attributed to him by A. G. More,¹ and given as "Ridge Point" in *Cybele*, ed. II. By the streamlet which rises near Black Lough, from its source to its mouth near Salia. In the west, seen only half-way along the northern margin of Annagh Lough.

¹ *Journ. Bot.*, xxvii., 118. 1889.

- ***Mimulus guttatus**, DC.—Stream near north end of Keel Lough, a form with brown-spotted corolla.
- Euphrasia borealis**, Towns.—By south side of Keel Lough.
- E. brevipila**, Burn. et Grem.—Very abundant. Specimens from Achill Head, Dugort, Valley Strand, Lough Nambrack, and Sraheens village, were confirmed by Mr. Townsend. E. S. Marshall also gathered it at the east end of the island (*loc. cit.*).
- E. curta**, Fr., var. **glabrescens**, Wettst.—By Keel Lough and Sruhllbeg Lough. Also (doubtfully) from Achill Head.
- E. Foulaensis**, Towns.?—A small, unbranched Eyebright, gathered on the summit of Croaghaun (2,192 feet), is doubtfully referred by Mr. Townsend to this northern form, characteristic of Shetland and the Færoes, and unrecorded from Ireland. I hope to collect the plant again next year, and decide the question of its identity.
- E. gracilis**, Fr.—By Keel Lough.
- E. scotica**, Wettst.—In two places near Lough Nakeeroge West, at Lough Acorrymore, and in two spots on Slievemore. Doubtfully also from Dugort.
- Melampyrum pratense**, L.—Rather rare. The var. *montanum* Johnst., on Slievemore and Croaghaun; var. *hians* is recorded from Sraheens Lough by Marshall (*loc. cit.*).
- Utricularia intermedia**, Hayne.—Sraheens Lough, and north end of Keel Lough.
- Lamium hybridum**, Vill.—Dooagh and Bull's Mouth, with *L. intermedium*, which is frequent in the eastern half of the island.
- Beta maritima**, L.—Sparingly about Keel, on shingle and on sand.
- Oxyria digyna**, Hill.—Plentiful on the highest part of the Slievemore rock-scarp.
- Polygonum Rall**, Bab.—Frequent at the west end of Trawmore.
- Salix herbacea**, L.—Along the Croaghaun ridge down to about 1,200 feet. Sparingly on the summit of Meenawn (1,530 feet).
- Juniperus nana**, Willd.—Chiefly about Croaghaun, as above and below L. Acorrymore, and abundant at Bunnafreva Lough West, Summit of Meenawn, and near Black Lough. Sea-stack near Dooega, twenty feet above sea-level, growing amid maritime plants. Usually absolutely prostrate, forming patches even lower than the shorn heath among which it grows.
- Listera cordata**, R. Br.—Slievemore and Croaghaun.
- Iris Pseud-acorus**, L.—Covering low sand-dunes near Keel—an unusual habitat.
- Juncus effusus**, L., var.—Near Sraheens village occurred a form with widely-spreading stems, many of them spirally curved, with several convolutions. I have gathered the same form on Inishmurray, Co. Sligo. Mr. Beeby informs me that in Orkney these spiral forms are frequent.
- Potamogeton nitens**, Weber.—Recorded from the stream flowing out of L. Keel by A. G. More (*loc. cit.*). Seen plentifully here, and also in several parts of Keel Lough itself, and in Sruhllbeg Lough, everywhere accompanied by *P. filiformis*.

- Potamogeton pectinatus**, L.—In great abundance in Lough Doo and Lough Nambrack, and thrown up on the shores in masses like *Zostera*. Sparingly in one of the Dooniver Loughs.
- P. filliformis**, Nolte.—Very abundant on the south and east sides of Keel Lough, and down the outflow river to the sea, where it occurs in pools on Trawmore. Also in Sruhillebeg Lough.
- Ruppla rostellata**, Koch.—Dooniver, in two brackish lakelets, and in one which is above tidal influence.
- Eriocaulon septangulare**, With.—East only, frequent. Sraheens Lough, whence it has been recorded by Marshall (*loc. cit.*), and very fine in bog pools to the north of it. Abundant in Lough Gall, and in three lakelets by the road $1\frac{1}{2}$ miles south of it. Mweelin Lough. More's record "in a small lake at north end of Achill" (*loc. cit.*) possibly refers to Lough Gall.
- Carex rigida**, Good.—Slievemore, 1,800–2,200 feet. Abundant on the Croaghaun range down to 1,200 feet.
- C. limosa**, L.—Lakelets S.E. of Lough Gall, and abundant at north end of Keel Lough. The plant at the latter station resembles *C. irrigua*, but Mr. Bennett writes "rather *limosa*, I believe."
- C. filliformis**, L.—Only in a swamp east of the north end of Keel Lough.
- Psamma arenaria**, R. & S.—At Doodega Head grows in boggy soil on the verge of the cliffs, 70 to 150 feet above the sea. No sand anywhere near.
- Agrostis vulgaris**, L., var. **pumila**, L. Frequent.
- ‡**Glyceria aquatica**, Sm.—One patch in a swamp on west margin of Lough Nambrack. While the range of this grass in Ireland is such as to render its occurrence here as a native highly improbable, no hint of introduction was gained by a study of the plant's surroundings.
- Hymenophyllum tunbridgense**, Sm.—About Slievemore and Croaghaun, not rare. *H. unilaterale* is very frequent.
- Adiantum Capillus-Veneris**, L.—"Cliff on north-west side of Achill Island! Mrs. Boycott."—A. G. More, 'Recent additions,' 1872. Base of Croaghaun, 1882—Hart, *loc. cit.* These notes refer, I believe, to the same station.
- Cystopteris fragilis**, Bernh.—Only on Slievemore, where it is abundant on the rocks at about 1,800–2,100 feet.
- Lastrea æmula**, Brack.—Common at all elevations. with *L. dilatata*.
- Isoetes lacustris**, L.—Growing on bosses of peat in Keel Lough, and among boulders in Annagh Lough.
- Chara fragilis**, Desv.—In the brackish lakelets at Dooniver.
- C. aspera**, Willd., var. **subinermis**, Kuetz.—Abundant in Keel Lough, Lough Doo, and Lough Nambrack.
- C. vulgaris**, L.—Pools on Keel Strand.
- Nitella opaca**, Agardh.—Growing on bosses of peat in Keel Lough, and on sand in Dooniver Loughs.

ANALYTICAL AND STATISTICAL NOTES.

From the above list it will be seen, I may remark in passing, that Achill scarcely deserves its former reputation for possessing "hardly a rare plant." The dozen rarest Irish species which grow on the island, and the number of botanical divisions from which they are on record, including their Achill stations, appears as follows:—

Ranunculus scoticus, 2.	Adiantum Capillus-Veneris, 7.
Cochlearia grænlandica 2.	Arctostaphylos Uva-ursi, 8.
Erica mediterranea, 2.	Oxyria digyna, 8.
Rubus cariensis, 3.	Epilobium angustifolium, 10.
R. dunensis, 3.	Potamogeton filiformis, 10.
Eriocaulon septangulare, 7.	Saxifraga umbrosa, 11.

This list will bear comparison with many equal areas on the west coast.

The additions (according to the *I.T.B.* standard) to the now well-worked flora of West Mayo resulting from my survey are as follows:—

Fumaria capreolata.	Rubus rosaceus (hystrix).
†Ulex Gallii.	8 Epilobium angustifolium.
8 Rubus cariensis.	Eryngium maritimum.
rhamnifolius.	*Tanacetum vulgare.
8 mucronatus.	Potamogeton pectinatus.
8 dunensis.	8 ‡Glyceria aquatica.

Of these, the five species marked "8" are new to District VIII. of 'Cybele Hibernica.'

Types of Distribution.—The most pronounced feature of the Achill flora is not so much the predominance in it of any "type of distribution," British or Irish, as its strongly calcifuge character. Taking the "Cybele Hibernica" lists, we find that out of 53 species marked as calcicole, the "calcicole A" group is unrepresented. Of "calcicole B" plants, four—*Anthyllis Vulneraria*, *Tussilago Farfara*, *Carex glauca*, and *Adiantum Capillus-Veneris*—are present; of "calcicole C" only one, namely, *Antennaria dioica*; in all, 5 out of 53. Whereas, of 46 Irish species marked "calcifuge A," Achill has no less than 39, or 85 per cent.

As regards the Irish types of distribution, the following table speaks for itself:—

Central,	.	0	out of 38	or	0	per cent.
Marginal,	.	15	„ 46	or	33	„
Ultonian,	.	3	„ 45	or	2	„
Mumonian,	.	0	„ 66	or	0	„
Lagenian,	.	‡1	„ 49	or	2	„
Connacian,	.	8	„ 63	or	13	„

It will be seen that the group best represented is the Marginal type, a calcifuge and monticole assemblage. The large Central group is entirely absent. In its comparative poverty in Connacian plants, in which it might be expected to excel, Achill accords with Clare Island and other western insular areas. Three Ultonian plants—*Epilobium angustifolium*, *Vaccinium Vitis-Idæa*, *Potamogeton filiformis*—extend down to Achill; all reach here, or hereabouts, their southern limit on the west coast. Mumonian plants, on the other hand, are completely absent. The only Lagenian species is the probably introduced *Glyceria aquatica*.

As regards Watson's types, Germanic plants are altogether absent, and English type very poorly represented. Of the Atlantic group, which is in Great Britain western, in Ireland marginal with a southern tendency, Achill is comparatively rich, possessing 12 out of 33 in Ireland. Of Scottish type plants, which in Ireland are northern-marginal, with a western tendency, Achill has 13 out of 50 in Ireland; in these figures *Ranunculus scoticus* and *Cochlearia grænlandica* are not included, not being classed by Watson. In the Highland type Achill is comparatively rich, having 10 species out of 42 in Ireland.

Comparison with Clare Island.—It is natural that some comparison should be made between the Achill flora and that of Clare Island, which I surveyed in a similar manner last year; but a very few notes on this point must suffice. The main features of such a comparison may be displayed as follows:—

	Clare I.	Achill I.
Area,	6½ sq. m.	57 sq. m.
Min. distance from land,	3 miles.	⅓ mile.
Greatest elevation,	1,520 feet.	2,204 feet.
Total flora,	368	416
Plants peculiar to each,	40	88

In this comparison, the most noteworthy points are the number of plants peculiar to Clare Island—40, or 11 per cent. of its total flora; and the fact that on Achill an increase of over 900 per cent. in area, as compared with Clare Island, results in an increase of flora of only 13 per cent.—a fact which bears eloquent testimony to the monotony of the conditions over a great part of Achill. An examination of the Achill and Clare Island lists shows also that a large number of common plants are absent from both. For details, the lists must be compared; and A. G. More's list of the plants of Inishbofin furnishes the means of usefully extending the comparison.

I have gratefully to acknowledge kind assistance, in the matter of critical plants, given by Messrs. Arthur Bennett, W. H. Beeby, H. and J. Groves, E. F. Linton, E. S. Marshal, H. W. Pugsley, W. Moyle Rogers, and Frederick Townsend.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include pairs of Rabbits from Mrs. Morrison and Miss K. Hall, an Oyster-catcher from Prof. C. J. Patten, a pair of Pigeons from Lord Kenyon, and a Wagtail from Messrs. Williams and Son. A pair of Beavers and thirteen Hedgehogs have been acquired for the new Rodent enclosure. The Council have decided to present a pair of Dublin Lions to the Zoological Gardens of New York. The Silver Medal for photographs of Animals in the Gardens has been awarded to D. H. Leonard and the Bronze Medal to C. M. Finny.

DUBLIN MICROSCOPICAL CLUB.

OCTOBER 11.—The Club met at Leinster House.

Dr. SCHARFF showed a slide containing nearly 100 species of Irish Ostracod Crustaceans, mounted by the late Dr. Malcomson of Belfast, whose collection was acquired by the Dublin Museum after his death. The principal features of the skilful method of mounting, and the general characters of the species dealt with, were pointed out to the members of the Club, and commented upon.

W. F. GUNN exhibited shoots of Black Currants, showing the effects of the currant bud mite (*Phytoptus ribis*). Sections of the present season's buds, under a 1-inch objective, revealed large numbers of the mites harbouring and feeding between the folds of the embryo leaves. The mites, which are extremely small, are most destructive; and, where large quantities of Black Currants are grown together, it is no uncommon occurrence for the entire crop to fail. Shoots were also shown bearing the remains of last season's buds, which had been, in consequence of the attack of the mites, arrested in growth and completely killed. A short account of the insect and some points in its life history are given in Leaflet No. 1 of the Royal Agricultural Society—copies of which can be obtained from the offices of the Department of Agriculture, 4 Upper Merrion-street, Dublin. A detailed account has been given by Warburton and Embleton in the Linnean Society's *Journal (Zoology)*, vol. xxviii.

F. W. MOORE showed orchid flowers of the genus *Catasetum*, and demonstrated their beautiful adaptation for cross-pollination.

J. N. HALBERT showed *Arrhenurus Moebii*, Piersig, a water-mite from Lough Gill, Sligo, new to the fauna of the British Islands. This species is described and figured in the current volume of the *Irish Naturalist* (p. 201, pl. 10, B., fig. 3).

Prof. CARPENTER showed *Xenylla brevicauda*, Tullb., a springtail new to the British Islands, from Lough Gill shore. The insect is described and figured in the current volume of the *Irish Naturalist* (p. 198, pl. 10, A., fig. 1-4).

LIMERICK FIELD CLUB.

NOVEMBER 3.—ANNUAL MEETING.—W. A. Beauchamp in the chair. The annual report was submitted. It stated that the membership stood at 117, as against 124 the previous year. The attendance at the winter meetings of the year was up to the average, and the Club was represented at the Field Club Union Conference at Sligo by six members and five visitors. An attempt to promote Club intercourse by opening the Club rooms every Tuesday evening met with only very slight support. The annual part of the Club Journal was published in June at a cost of £22 3s 11d. The finances of the Club are in a satisfactory condition. The response to the suggestion to raise a fund to provide a memorial to Eugene O'Curry has been disappointing. The report was adopted. The following were elected officers for the ensuing year:—President, H. Vereker Morony; Vice-Presidents, P. J. Lynch, C.E., and W. A. Fogerty, M.D.; Committee, Mrs. Gibson, Miss Alice Doyle, E. H. Bennis, Mrs. Dodd, B.A.; B. Barrington, Rev. J. H. Thomas, B.A.; J. P. Dalton, M.A.; Treasurer, Joseph Stewart; Secretaries, George Fogerty and J. F'G. Windle. A variety of exhibits were on view during the evening, and a series of lantern slides was shown.

THE PRE-GLACIAL RAISED BEACH OF THE SOUTH COAST OF IRELAND.¹

BY W. B. WRIGHT, B.A., AND H. B. MUFF, B.A., F.G.S.

ALONG the greater portion of the northern shore of Courtmacsherry Bay there stretches a remarkably smooth platform of rock about 5 feet above high-water mark. At a varying distance from its seaward edge it disappears beneath a mass of drift. The drift deposits lie on the waterworn platform, and are banked against a cliff or slope of rock which rises from behind them to a height of 150 feet above ordnance datum. They are packed into the angle between the platform and the cliff, and form a terrace of varying width.

The succession and relation of the deposits to one another are shown in the following diagram² :—

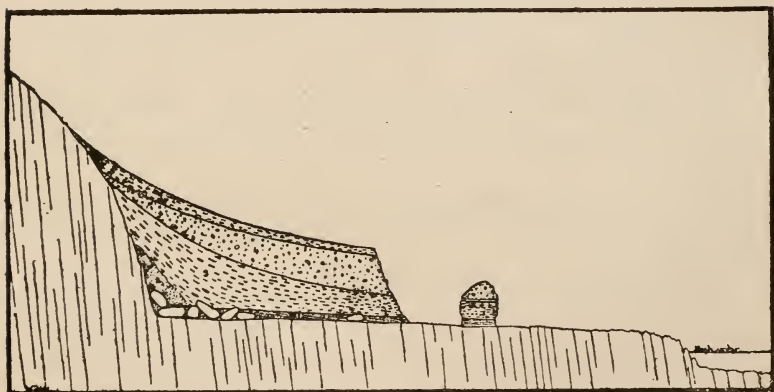


Fig. 1.—Diagram of Section in Courtmacsherry Bay.

- | | |
|------------------|------------------------------------|
| 5. Upper head. | 2. Blown sand. |
| 4. Boulder-clay. | 1. Raised-beach gravel and blocks. |
| 3. Lower head. | |

The rock-platform is cut across the edges of the highly inclined black slates and sandstones of the Carboniferous Slate series. It is raised about 5 feet above high-water mark of ordinary spring tides.

¹ A more complete account of this beach has recently been published by the writers. *Sci. Proc. R. Dubl. Soc.*, vol. x., 1904, pp. 250-324, pls. xxiii-xxxi.

² Reproduced by permission of the Royal Dublin Society.

The raised beach gravel is cemented by oxides of iron. The blocks which lie on the platform and embedded in the gravel sometimes attain a length of 10 feet. They are of similar nature to the rocks in the pre-glacial cliff above, having fallen from it during the formation of the beach.

The blown sand overlies the beach gravel and blocks, and is banked against the old rock-cliff behind the head, which has obviously slipped down little by little over it.

The head is composed of angular material derived from the waste of the old rock-cliff against which it is banked. The parallelism of its fragments gives it an appearance of stratification when viewed from a distance.

The boulder-clay is a stiff clay containing scratched stones, some of which have been transported for long distances. It was laid down by ice moving out to sea over the top of the cliff. It is to their position in the lee of the cliff, as well as to the feebleness of the glaciation, that the pre-glacial deposits owe their preservation.

The upper head is similar to the lower, but contains a small number of sub-angular and rounded stones derived from the boulder-clay.

The outstanding stack, figured in the diagram, shows that the drift deposits originally covered a much greater portion of the platform.

The above may be taken as typical of a number of sections to be seen all along the south coast of Ireland from Carnsore Point to Baltimore. The complete series of deposits is, however, not always represented. Sometimes one member is absent, sometimes another, but the succession is invariable.

The superposition of the boulder-clay proves the pre-glacial age of the lower head and raised beach. The lower head in its turn marks a period before the oncoming of the ice, when débris from the old sea-cliff accumulated on the beach, after it had been raised above the reach of the waves. The occurrence of blown sand close down to the rock-platform indicates that elevation commenced before the head began to accumulate. As regards the amount of this elevation, observations made all along the coast show that the difference in level between the pre-glacial and modern shore-platforms is about 12 feet. The head is, however, being at present removed by the sea, so that

a somewhat greater uplift must have taken place in order to allow of its accumulation. We have no means at present of determining the amount of this elevation, but it must have been at least 10 or 20 feet above present level. It may have been immensely greater.

With regard to the climatic conditions during the formation of the head or rubble-drift there is little to be said. Its general similarity to modern screes suggests the action of frost or of rapid alterations of temperature in shattering the rocks from which it was derived. There are two points, however, in which it differs materially from ordinary screes, and which seem to indicate the action of periodic heavy rains: namely, the amount of loam and sand it contains, and the distance the finer material is carried from the cliff.

The occurrence above the boulder-clay of a rubble-drift similar to the lower head, indicates a return of similar conditions after the ice had melted away.

Before leaving this question of climate it is worth calling attention to the fact that a few erratics derived from districts a considerable distance to the east were found in the underlying raised beach gravels. For the transport of these it is almost necessary to suppose the existence of floating ice, and it may well be, that the lowering of temperature thus indicated may have been intensified during the formation of the head, and may finally have culminated in the invasion of the district by land ice.

The finding of the raised beach along the shores of the submerged river-valleys of the South of Ireland is a point of considerable interest; showing, as it does, that their submergence took place in pre-glacial times. It may thus be said in summing up that we have evidence of the following sequence:—

1. Land higher than at present—erosion of valleys now submerged.
2. Land depressed to about twelve feet below present level—formation of raised beach.
3. Land again elevated to an unknown extent above its present level—accumulation of blown sand and lower head.
4. Advance of the land ice over the whole south coast of Ireland, and deposition of the boulder-clay.
5. Accumulation of the upper head.

The occurrence of a beach obviously of the same age as that of the South of Ireland has been recorded over a very wide area. It is found in Yorkshire, South Wales, and on the south coast of England. The pre-glacial rock platform has been detected in the Isle of Man, and on the south side of Bray Head in Wicklow. It has also been recently reported as observed in Clare on the west coast of Ireland, and in North Wales. It has been traced along the French coast of the English Channel round into the Bay of Biscay.

From the occurrence of this beach over so wide an area in the British Isles, it seems exceedingly probable that Ireland was already insulated before the Glacial Period. This, taken with the undoubted fact that the island was entirely covered by ice during the Glacial Period, may help to throw light on the manner and date of introduction of our present fauna and flora.

Jermyn Street, London.

NOTES.

ZOOLOGY.

Vertigo angustior in Co. Carlow.

With reference to Messrs. Welch and Stelfox's note in *Irish Naturalist*, September, 1904, page 191, saying that "all records so far prove it to be a strictly maritime species," I would mention that there is a colony of *Vertigo angustior* in Co. Carlow close to Borris bridge over the River Barrow on the south side. They are to be found in wet spongy moss near the river. I took a number of live specimens. See *I. Nat.*, 1903, p. 309.

P. H. GRIERSON.

Clondalkin.

Lepidoptera at Portlaw, Co. Waterford.

A very fine specimen of the Death's-head Moth (*Acherontia atropos*) was captured near the rectory, on 20th September, 1904, and given to me. It squeaked a good deal, and frightened one of its captors so much that he declared he was bitten by it! When I got it, it was quite dead. It had been for several days on a plate under a dish cover, but not a scale seems to have been rubbed off.

Sphinx convolvuli occurs here, but I have not seen it for several years. I have two local specimens of *Geometra papilionaria* in my collection.

WILLIAM W. FLEMING.

Coolfin, Co. Waterford.

Swimming Powers of the Oyster-catcher.

I was much struck with the swimming powers of an Oyster-catcher (*Hematopus ostralegus*), which I witnessed at the North Bull, Dublin Bay, when in company with Messrs. A. and E. Williams, on October 23, 1904. The bird, when we first saw it, was wading along the water's edge, and as we mounted the sand-hills and appeared in full view it commenced to race along the beach for a short distance and then took to the water. It was slightly wounded, and unable to fly. Swiftly and strongly it headed out to sea, retreating from us as we ran down to the water's edge to intercept a gunner who was approaching us along the shore and who, we were afraid, would seal the poor bird's fate before it could swim out of gunshot range. Happily, however, fully 80 yards of water were traversed ere the shooter arrived opposite it, and by diverting his attention we managed to get him to pass by the bird without observing it. Next we directed our gaze seawards and descried the Oyster-catcher as a small dark object bobbing up and down on the waves some 200 yards from the shore. We expected it would reach a sand-bank about to be laid bare by the ebbing tide; instead of this, however, it retraced its course and headed for the beach, swimming strongly against the tide. Seeking ambush amid the rushes of the sand-dunes, we watched the bird swim in. Directly it landed I rushed after it barefooted (lest the bird might take to the water a second time), and after an exciting chase along the shore succeeded in capturing it. On examination the bird proved to be a beautiful adult in fine plumage and only slightly injured in the right wing. Curiously enough, the rich crimson pigment was absent over a small area of the iris, giving to the pupil an irregular and rather jagged outline. This condition was symmetrical in both eyes. In the afternoon I took the bird to the Dublin Zoological Gardens, where it is to be hoped it will have a happy time and end its days in peace.

I noticed that the wing had healed considerably, so that the bird had probably been living a week or more in a disabled condition on the beach before I captured it. The wonder is how it escaped, as wounded birds have to run the gauntlet of being attacked by many enemies—Man Dogs, Hawks, Skuas, and the larger Seagulls. For instance, during the short time that we saw it on the water, a flock of screaming Herring-Gulls passed over it. Their cries attracted a Great Black-backed Gull, which made a few nasty swoops at the poor Oyster-catcher. Indeed I doubt if the latter would have reached the shore alive had not a few Herring-gulls mobbed the assailant, driving him off with angry threats. It is interesting to note that it was directly after the Gulls cleared away the Oyster-catcher began to swim for the shore. Question—Could the bird have apprehended further danger on the water or was it simply exhaustion that drove it ashore? Or both? I may add that I have repeatedly seen several species of Limicoline birds swim, generally but not always to escape danger, and usually for shorter distances than the above instance which I have recorded.

University College, Sheffield.

C. J. PATTEN.

REVIEWS.

THE FLORA OF DUBLIN,

Flora of the County Dublin: Flowering Plants, Higher Cryptogams, and Characeæ. By Nathaniel Colgan. M.R.I.A. Pp. lxx + 324. Map. Dublin: Hodges, Figgis & Co., Ltd. 1904. Price, 12s. 6d. net.

The County of Dublin, though one of the smallest comital divisions of Ireland, has long been known to have a large and varied flora, and from the earliest period of Irish botany its plants have figured in learned books. The area surrounding the metropolis has naturally been the playground of hibernian phytologists; and their recreations are reflected in the botanical literature of their day. From Threlkeld to Colgan, the authors of books on Irish botany have mostly been resident in Dublin; and as a consequence, the published records of Dublin plants bulk far heavier than those of any other part of the country. Yet, curiously enough, although the promontory of Howth and the island of Lambay have been monographed, no flora (in the modern acceptance of that term) of the whole county has ever been attempted, for we can hardly admit as such the "List of the Flowering Plants of Dublin and Wicklow" hurriedly prepared for the British Association meeting in 1878. During the last nine years, Mr. Colgan has supplemented the already existing material by means of a laborious and searching exploration of every part of the county, and he now presents us with a detailed account of the flora in 394 octavo pages. While all who are acquainted with Mr. Colgan's thorough methods anticipated a valuable and comprehensive work, few, we imagine, were prepared for a book written on so elaborate a plan, or published in so sumptuous a style. No work has hitherto appeared on Irish botany so detailed in its information, so critical in its treatment, or so handsome in its appearance.

The task to which Mr. Colgan set himself nine years ago was by no means a light one. Most of the previous botanical work in the county had been of a desultory character, and although the Dublin list already attained to large proportions, and to some appearance of completeness, the range of most of the plants in the county was still unknown, and certain less accessible areas were as yet, for all practical purposes, unexploited. The thorough exploration of the county was thus in itself an affair of no small labour, and to this our author attached other conditions sufficiently onerous:—“(1) That I should see with my own eyes growing, in at least one County Dublin station, and, if possible, within the present century, every species admitted to the flora; (2) that I should ascertain, by personal observation in the field, their vertical ranges, their flowering seasons, their durations, and their soil affinities; and, finally (3), that I should collect from the lips of the country folk the current popular names of such of the plants as were likely to find a

place in their thoughts and in their every-day speech." While, in viewing the degree of success attained in the performance of these self-imposed tasks, the unaccomplished may loom large in the eye of the author, to the reader the work accomplished appears prodigious, the results invaluable, and the success complete.

The 70-page introduction which prefaces the Flora proper, furnishes interesting reading throughout. Its scope is seen from the following list of the sections into which it is divided:—1, History of the Flora; 2, Physical Features; 3, Climate; 4, Characteristics of the Flora; 5, Relations of Plants and Soils; 6, Vertical Range of Plants; 7, Duration of Plants; 8, Popular Plant Names; 9, Botanical Sub-division of the County; 10, Explanatory Notes on the Text. The twelve pages devoted to the historical sketch constitute quite one of the most interesting portions of the book; in the archæological aspect of the flora Mr. Colgan is especially at home, and his biographical notes have a value quite outside the domain of botany. The sections on floral characteristics and soil relations are replete with valuable statistics and comparisons; while the remarks on duration constitute a little essay on that curious question—What is an annual? As regards the botanical sub-division of the county, a purely artificial scheme is adopted, the political division into eight baronies being used; considering the nature of the natural petrological or orographical boundaries, and the way the former are complicated or altered by the nature of the superficial deposits, no better scheme is available.

Coming now to the body of the work, several features stand out conspicuously as one studies it. The conservative nomenclature of *Cybele Hibernica* is followed throughout; the systematic names are supplemented by a sprinkling of synonyms, names in Irish where these were obtainable, current local names, many of them quaint and interesting, and the common English names. The fulness of the locality-lists which follow the names of the rarer plants is very striking, and the importance of the author's own contributions to the same particularly so. The county has been ransacked from end to end, and it would be hard to find a spot on which Mr. Colgan's searching glance has not rested. Such a spot is possibly to a small extent to be found in Lambay Island. Here *Agrimonia odorata*, in the Flora recorded from a single station, is abundant, growing amid groves of *Rubus plicatus* (unrecorded for the county), and of *R. leucostachys* and *R. pulcherrimus*, neither of which is recorded from this botanical district; *Lamium intermedium* and *Juncus obtusiflorus*, both local in the county, also grow on the island. The only other stations of rarer plants which we can add to Mr. Colgan's exhaustive lists are Glencullen for *Vicia sylvatica*, and Skerries for *Lemna gibba*; the only record published in the book which we venture to doubt is an old one, "wet slopes of the Dublin mountains" for the lowland and calcicole *Stellaria palustris*.

Next, the extreme severity of the treatment as regards the standing of species as natives or otherwise excites attention. County Dublin is well known as being the centre of the introduced element in the Irish flora,

but in this book the process of challenging is carried beyond the bounds that many botanists would be content to fix. The dividing lines between the precise shades of probability of early human introduction are so fine, and the questions which arise so speculative and so dependent on personal cast of thought, that we confess we look with envy on our author's definite classification. It signifies a vast amount of critical study of habitats and ranges. The book is full of denizens, colonists, aliens, and the Appendix of casuals. Of the 750 plants admitted to the flora, nearly one-fourth have their nativity called in question. These include such plants as *Barbarea vulgaris*, *Sisymbrium officinale*, *S. Alliaria*, *Capsella Bursa-pastoris*, *Reseda Luteola*, *Valerianella olitoria*, *Anagallis arvensis*, *Mentha arvensis*, *Salvia Verbenaca*. *Echium vulgare* is a denizen, *Raphanus maritimus* a colonist, *Milium effusum* a casual. On the standing of some presumably indigenous species, such as *Stellaria uliginosa*, *Rubus saxatilis*, *Menyanthes trifoliata*, *Atriplex littoralis*, *Festuca rubra*, our author is silent. On the other side of the account, it is pleasant to see the local claims of a few interesting plants, which have been sometimes questioned, fully admitted—for instance, *Crambe maritima*, *Lavatera arborea*, *Crepis taraxacifolia*, all now set down as natives without doubt. The flora is further enriched by the admission, to the naturalized section, of plants which in 1898 were excluded from the Irish list in *Cybele Hibernica*; such, for instance, are *Silene conica*, *Acer Pseudo-platanus*, *Anthemis arvensis*, *Lycium barbarum*, *Linaria purpurea*, and *Fagus sylvatica*. Considering that the aim of the book, to use the author's words, is "to exhibit in full detail the Ancient and Present state of the Dublin Flora," it seems a pity that such rare and interesting natives as *Merensia maritima* and *Typha angustifolia*, which were certainly gathered in the county within the last century, should not figure in their proper place, instead of being relegated to the Appendix, amid a crowd of casuals and errors.

A prominent feature of the book is the valuable critical notes which abound throughout, as instances of which we may refer to the remarks under *Draba verna*, *Capsella Bursa-pastoris*, *Medicago sylvestris*, or *Primula vulgaris*. But while a large number of critical varieties or forms are mentioned, Mr. Colgan is by no means an enthusiastic "splitter." Thus, the three British forms of *Alchemilla vulgaris* and the two segregates of *Valeriana officinalis* are practically discarded as unworthy of even varietal rank. As regards some other critical groups, *Rubus* is conspicuous as being the only genus of which local knowledge is still quite inadequate. Only twenty-five fruticose *Rubi* are recorded, many of them from a single station; and hardly a note appears that was not embodied in *Cybele Hibernica* six years ago. The *Roses* are also as yet incompletely known. In the genus *Fumaria*, a single locality is given for *F. muralis*. In view of the disruption of the British records for this species by Mr. Pugsley, it would be interesting to know if this record bears that authority's *imprimatur*. If so, it is the only Irish station for *F. muralis* that can at present be relied upon. Under *Lamium*, by the quotation of *L. purpureum* \times *amplexicaule* as a synonym for *L. intermedium*, and *L. amplexicaule* \times *purpureum* for *L. hybridum*, a hybrid origin for these two

plants is suggested. On that hypothesis, it is difficult to account for portions of the Irish distribution of these forms. In Achill Island, for instance, where *L. intermedium* is frequent, *L. amplexicaule*—one of the hypothetical parents—is absent; and in Down and Antrim the former is very much more abundant than the latter, and affects a different kind of habitat.

In connection with the *Characæ*, a curious feature of the Dublin flora becomes conspicuous. This is the way in which the two canals which enter Dublin from the west have served as routes by which plants native in the Central Plain have migrated eastward, and formed colonies here. These are very properly classed as aliens in Dublin, though they may be widely distributed natives of Ireland.

The extent to which the county flora has been artificially or fallaciously enriched by casual introductions or erroneous determinations is shown by the bulk of the Appendix, in which over 250 plants are condemned and executed. Here, as elsewhere, accuracy of detail and excellent discrimination are the prevailing note.

The map which terminates the volume does not maintain the high standard of excellence which pervades the letterpress. It is a reprint, with slight additions in the way of rail and tram lines, of the Dublin map in Philip's "Atlas and Geography of Ireland" of some twenty years ago, and is not adequate or up-to-date. Thus, the North Bull, an island over 3 miles in length—which is constantly mentioned in the text—does not appear at all; and the suburbs of Dublin are much changed since the map was constructed. Throughout the county, a large proportion of the places mentioned in the book are not named on the map. But as a key to the botanical divisions, and an illustration of the general topography of the county, it serves its purpose.

In a supplement of fifteen pages, the local names which figure in the book are re-arranged alphabetically, with notes. This interesting branch of his subject Mr. Colgan has pursued with success, and his list, with its philological and therapeutic notes, and quaint scraps of folk-lore, furnishes evidence of close inquiry and of wide reading, and is a valuable contribution to a subject as yet almost neglected in Ireland.

As a natural result partly of its thoroughness and largely of the smallness of the *clientele* to which it appeals, the book is an expensive one. We do not grumble at paying 12s. 6d. for it, for access to the store of information which it contains would be cheap at double the price. But without doubt its cost will place the Flora beyond the reach of many who would have acquired a cheaper volume, and thus one of the ends for which such labour is undertaken will be partially defeated. So long as an intelligent interest in the plant-life of their own country is the inheritance of so small a circle, we do not see how this can be avoided.

R. L.L. P.

NATURE STUDY.

Eton Nature-Study and Observational Lessons. *Part II.* By M. D. HILL, M.A., F.Z.S. and W. M. WEBB, F.L.S. London: Duckworth & Co. Price, 3s. 6d. net. Illustrated.

This is a book commended, as we learn from the "Foreword" to Part I. (which is, however, not the part immediately under review), both to "the Teacher and the Learner," and doubtless both will find it helpful. At the same time we believe that on the whole it is undesirable for young nature-students to be hampered with books, so that it is to the teacher rather than to the learner that we would recommend this.

Part II. consists of some twenty-two chapters along with seventeen observational lessons, and an appendix containing a list of the materials required for the work suggested.

The chapters form decidedly the best part of the book. From them the teacher cannot fail to obtain valuable suggestions for lines of work in very many directions, both as regards plants and animals. The observational lessons strike us as being less valuable. They consist of detailed directions to the pupil, the very formality of which would seem calculated to partially defeat the object of the authors.

We have found by experience that such instructions to the pupil are more of a hindrance than a help, and that questions and suggestions from the teacher at the time are far more valuable than printed directions to the pupil to "discover other structures . . .," &c. The individual lessons suffer also in many cases by dealing with too many subjects in the allotted hour. Thus we find Lesson xxiii. starting with a potato tuber, taking a jump suddenly to a wood-louse, coming next to an opening flower, and finally ending up with silk-worm eggs. The preparations for work mentioned at the head of each lesson, such as "Distribute the dwarf bean seedlings which have been grown in soil," seem frequently superfluous, and those involving actual preparation, such as the germination of seeds, &c., should, of course, be carried out by the pupils themselves. It is to be regretted, too, that more of these lessons are not devoted to the simpler experiments which can be easily performed leading to observations on the physiology of plants. Making drawings merely from morphological studies is apt to become tedious especially to those pupils—and they are, as a rule, not a few—to whom drawing does not strongly appeal. The spaces which are so often directed to be left in the note-book "for a finished drawing" are probably to be filled up during that gloriously long leisure time which is the inheritance of the average school boy, which each master unconsciously assumes the sole right to encroach upon, but which the boy himself probably utilises, and rightly so, for strictly "out of school" purposes!

G. H. P

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